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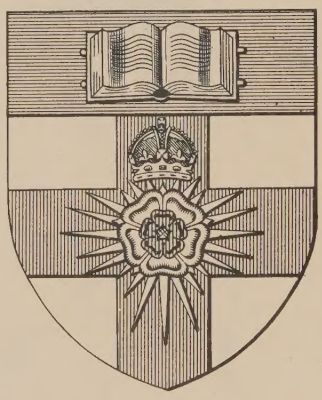

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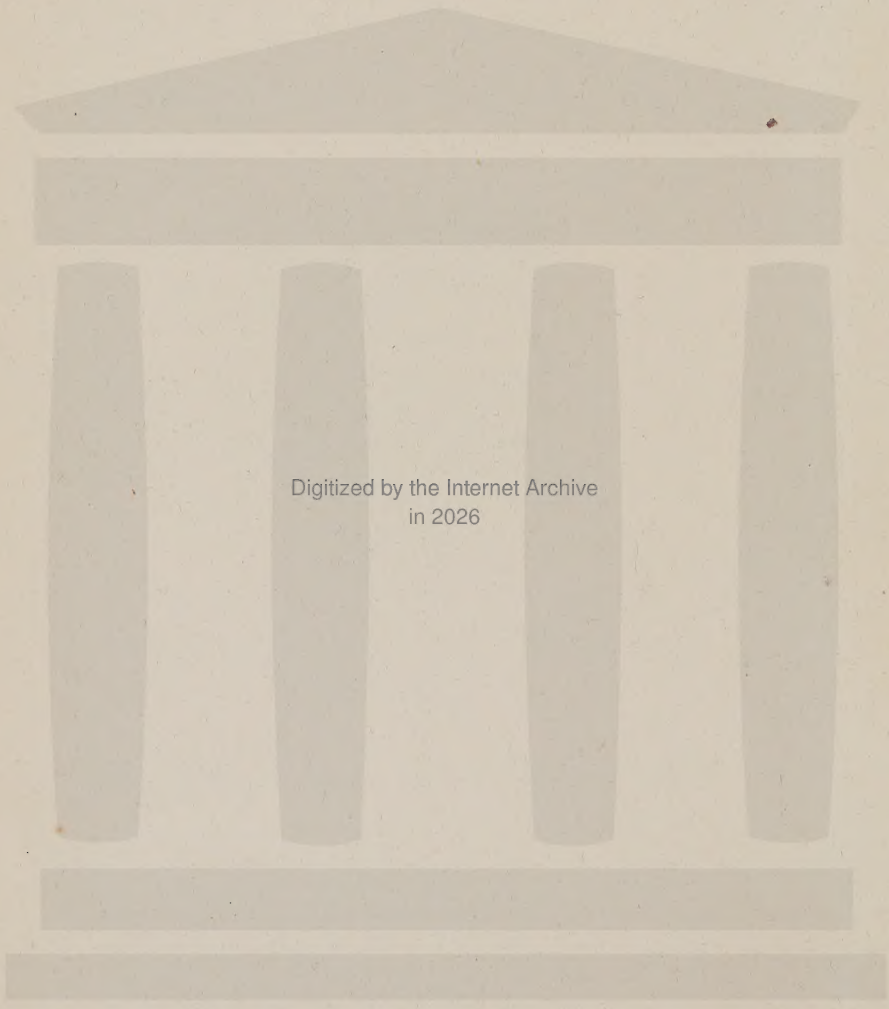

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PREFACE

THIS Part, which completes the Subject Index on Physics, deals with Electricity and Magnetism under the Registration Numbers 4900 to 6850; it contains 23,300 entries, thus making in all 56,644 entries for the subject Physics for the years 1800 to 1900 inclusive.

Miss Alice Everett co-operated in sorting for the Press the slips of the sections on Electrostatics and Magnetism and of a portion of that on the Electric Current; Mr Hargreaves undertook the sections on Electromagnetic Waves, Influence of Electric and Magnetic Fields on Light, and Electric Discharge; the slips for the remainder of the volume were sorted by Dr W. Marshall Watts.

February, 1914.

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Bône Ac. Hip. Bll. ..... B.M.

Cg. Int. Hyg. C. R. ..... B.M.

D. Arch. Kl. Md. ..... Deutsches Archiv für Klinische Medicin. Leipzig. 1866— Camb.U.; Oxon.R.; R.C.Surg.

D. Nf. Tbl. ..... R.S.*i.*

Fr. S. Ag. Mm. ..... P.O.*i.*

Helsingf. Acta ..... P.O.*i.*; R.C.Surg.

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I. Égypt. Bll. ..... B.M.

I. Mn. Mtl. T. ..... Transactions of the Institution of Mining and Metallurgy, London. London. 1892— B.M.; Camb.U.*i.*; Geol.M.*i.*; Geol.S.; Glasg.U.*i.*; N.H.M.; P.O.; R.S.*i.*; S.K.

Jena Sb. ..... R.C.Surg.

J. Pl. ..... The Journal of Physiology. Cambridge, London. 1878— B.M.; Camb.P.S.*i.*; Camb.U.; Edinb.U.; Glasg.U.; N.H.M.*i.*; Oxon.B.; Oxon. R.; R.C.Surg.; R.S.; S.K.; U.C.L.

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Nt. ..... N.H.M.

N. Y. Ms. Bll. ..... P.O.

Obs. ..... R.S.

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Par. N. Bll. S. Phlm. ... *See* **Par. S. Phlm. N. Bll.**

Rpm. Met. ..... *See* **Wild Rpm. Met.**

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Tel. J. ..... The Telegraphic Journal. A weekly Record of Electrical Progress. London. 1864. B.M.; Oxon.B.*i.*; P.O.; U.C.L.*i.*

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U. S. Sig. Serv. Pp. ..... 1881—85. *Complete at* R.A.S.; R.Geogr.S.

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— — (— —, Korteweg). *Waals, J. D. van der.* Amst. Ak. Vh. 20 (1880) (*No.* 1) 12 pp.
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— or ions, dynamics of system. *Larmor, J.* Camb. Ph. S. T. 18 (1900) 380–.
—, moving, and electric charges, theory. *Morton, W. B.* L. Ps. S. P. 14 (1896) 180–; Ph. Mg. 41 (1896) 488–.
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Ionisation and electrons, investigations of J. J. Thomson. *Perkins, C. A.* Science 12 (1900) 368–.
Luminiferous and electric medium, dynamical theory. *Larmor, J.* [1893] Phil. Trans. (A) 185 (1895) 719–.
— — — —, — —. (Electrons, theory.) *Larmor, J.* [1895] Phil. Trans. (A) 186 (1896) 695–.
— — — —, — —. (Relations with material media.) *Larmor, J.* [1897] Phil. Trans. (A) 190 (1898) 205–.
— — — —, — —. (Electrodynamic equations of moving material medium, and electrostriction.) *Larmor, J.* R. S. P. 63 (1898) 365–.
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— — — — — — — — and nickel wires. *Nagaoka, H.* Tōk. Coll. Sc. J. 3 (1890) 235–.
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— — in iron and nickel wires, relations. *Nagaoka, H., & Honda, K.* [1900] Tōk. Coll. Sc. J. 13 (1900–01) 263–.
— stress, effect on magnetisation of nickel. *Nagaoka, H.* [1888–89] Tōk. Coll. Sc. J. 2 (1889) 283–; 3 (1890) 189–.
— — (longitudinal), effect on magnetisation of nickel. *Bottomley, J. T., & Tanakadaté, A.* Ph. Mg. 27 (1889) 133–.
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— cylinder, time of hysteresis in. *Smith, F. J.* Ph. Mg. 31 (1891) 64–.
— diaphragms, behaviour in periodic magnetic field. *Kalischer, S.* Elekttech. Z. 13 (1892) 59–.
—, magnetic qualities. *Ewing, J. A., & Klaassen, (Miss) H. G.* [1893] Phil. Trans. (A) 184 (1894) 985–.
—, magnetisation. *Magrini, F.* Rm. R. Ac. Linc. Rd. 4 (1888) (*Sem.* 1) 734–.
—, —. *Ewing, J. A.* [1889] R. S. P. 46 (1890) 269–.
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—, — — — —, intensity. *Gerosa, G. G., & Finzi, G.* Rm. R. Ac. Linc. Rd. 7 (1891) (*Sem.* 2) 253–.
—, — — — primary and secondary currents, intensity. *Gerosa, G. G.* Mil. I. Lomb. Rd. 24 (1891) 1196–.
—, —, curves. Residual magnetism. *Hopkinson, J.* [1885] Phil. Trans. 176 (1886) 455–.
—, —, effect of electric currents in iron. *Hopkinson, J.* [1895] R. I. P. 14 (1896) 539–.
—, nickel and cobalt, effect of magnetic induction on physical properties. *Tomlinson, H.* [1889–91] Phil. Trans. (A) 182 (1892) 341–.
—, sheet-, magnetic examination. *Röhr, W.* Elekttech. Z. 19 (1898) 712–.
—, slow changes in permeability. *Mordey, W. M.* R. S. P. 57 (1895) 224–.
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— — —, — and hysteresis. *Du Bois, H., & Jones, E. T.* Elekttech. Z. 17 (1896) 543–.
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— —, phenomena. *Bakhmet'ev [Bachmetjev], P.* (xii) Rs. Ps.-C. S. J. 15 (*Ps., Pt.* 1) (1883) 173–; J. de Ps. 3 (1884) 464; Exner Rpm. 27 (1891) 147–.
— — of steel. *Abt, A.* Orv.-Termt. Éts. (*Termt. Szak*) (1895) 319–, 353–.
— — — — and magnetite and nickel. *Abt, A.* Orv.-Termt. Éts. (*Termt. Szak*) (1897) 229–, (*Rv.*) 199–.
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— — —, — — iron and steel in. *Baily, F. G.* [1894–96] B. A. Rp. (1894) 576–; Phil. Trans. (A) 187 (1897) 715–.
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—, coercive force rendered permanent by compression. *Clémandot, L.* C. R. 95 (1882) 587–.
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— — — — — transformer, measurement. *Ewing, J. A.* Elect. 27 (1891) 631–.
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— — in dynamo. *Corsepius, M.* Elekttech. Z. 13 (1892) 443–.
— — — — armature. *Steinmetz, C. P.* Elekttech. Z. 13 (1892) 550.
— — and eddy currents. *Grau, A.* Wien Ak. Sb. 107 (1898) (*Ab.* 2*a*) 495–.
— — — — —. *Niethammer, F.* Elekttech. Z. 19 (1898) 669–, 688–.
— — — — —, measurement, Rowland's method. *Potts, L. M.* Am. J. Sc. 10 (1900) 91–; J. H. Un. Cir. [19 (1899–1900)] 63.
— — — — —, in transformers. *Evershed, S., & Vignoles, E. B.* Elect. 27 (1891) 664–; 29 (1892) 583–, 605–.
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— —, in iron. *Gill, J. L. W.* Elect. 39 (1897) 718–.
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— —, at low temperatures. *Ford, A. H.* Sc. Abs. 2 (1899) 851.

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— —, — straight iron strips, measurement. *Fleming, J. A.* L. Ps. S. P. 15 (1897) 202–; Ph. Mg. 44 (1897) 262–.
— —, time increase. *Ford, A. H.* Sc. Abs. 3 (1900) 557–.
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— —, geometrical demonstration. *Busquet, R.* [1898] Lyon S. Ag. A. 6 (1899) xxxix–.
— — by oscillatory condenser discharge. *Klemenčič, I.* Wien Ak. Sb. 104 (1895) (*Ab.* 2*a*) 724–; 107 (1898) (*Ab.* 2*a*) 330–.

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—, magnetic action on axes. *Plücker, J.* Moigno Cosmos 7 (1855) 391–.
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—, — investigations. *König, W.* A. Ps. C. 31 (1887) 273–; 32 (1887) 222–.
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— — —, — — magnetisation. *Tomlinson, H.* [1886] Phil. Trans. (A) 179 (1889) 1–.
— modulus, effect of magnetisation. *Stevens, J. S.* Ps. Rv. 11 (1900) 95–.
— —, Young's, effect of magnetisation. *Tangl, K.* Mth. Termt. Éts. 18 (1900) 49–; Mth. Nt. B. Ung. 18 (1903) 7–.
— of rods, effect of magnetisation. *Stevens, J. S., & Dorsey, H. G.* Ps. Rv. 9 (1899) 116–.
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— — — —, — (Wertheim). *Delarive, A.* Bb. Un. Arch. 1 (1846) 170–.
— — — —, — (—). *Guillemin, C. M.* C. R. 22 (*1846) 432–.
Magnecrystallic action, Poisson's theoretic anticipation. *Tyndall, J.* B. A. Rp. (1852) (*pt.* 2) 20–.
— phenomena. *Thomson, (Sir) W.* N. Cim. 4 (1856) 192–.
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Structure of iron, influence on magnetic properties. *Leroux, F. P.* C. R. 45 (1857) 477–.
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Heat conductivity, effect of magnetism. *Penrose, C. B., & Trowbridge, J.* Am. Ac. P. 18 (1883) 210–.
— —, — — —, in iron (soft). *Maggi, P. G.* Bb. Un. Arch. 14 (1850) 132–.
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(Treatment by mechanical theory of heat.) *Wassmuth, A.* [1882] Wien Ak. Sb. 86 (1883) (*Ab.* 2) 539–; 87 (1883) (*Ab.* 2) 82–.
Bachmetjev, P. Rs. Ps.-C. S. J. 16 (*Ps.*) (1884) 81–; Fschr. Ps. (1884) (*Ab.* 2) 836–.
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— —and nickel wires (stretched). *Bachmetjev, P.* Rs. Ps.-C. S. J. 24 (*Ps.*) (1892) 1–; J. de Ps. 1 (1892) 438.
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—, —, pyromagnetic machines. *Wallentin, J. G.* Humb. 9 (1890) 257–.
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Le Gallois, C. J. J. Nauche J. du Galvan. 1 (1802) 49–, 97–.
Ritter, J. W. [1803] Nicholson J. 7 (1804) 288–.
Parrot, G. F. Gilbert A. 21 (1805) 192–.
Sage, B. G. J. de Ps. 66 (1808) 207–.
Sylvester, C. Nicholson J. 26 (1810) 72–.
Robinson, T. R. Ir. Ac. T. 13 (1818) 121–.
Delezenne, —. Lille Sé. Pbl. 5 (1819) 10–.
Delarive, A. [1834] A. C. 62 (1836) 147–.
Liebig, J. von. Lieb. A. 16 (1835) 113–.
Delarive, A. A. C. 61 (1836) 38–.
Delffs, W. Pogg. A. 38 (1836) 464–; 44 (1838) 78–.
Petrina, F. A. Baumgartner Z. 5 (1837) 511–.
Binks, C. Ph. Mg. 13 (1838) 54–, 135–, 171–, 276–.
Jeffery, J. [1838] Electr. S. T. (1837–40) 51–.
(Work and opinions of the Germans.) *Wartmann, É.* Arch. de l'Électr. 1 (1841) 31–.
(— — — — — —.) (Wartmann.) *Delarive, A.* Arch. de l'Électr. 1 (1841) 67–.
Ledeau, —. (VI *Adds.*) Majocchi A. Fis. C. 28 (1847) 41–.
Bouchotte, Émilien. Metz Mm. Ac. 40 (1858–59) 451–.
Callaud, A. [1859] (XII) Lille S. Mm. 6 (1860) 381–, LII–.
Steinert, —. Dingler 160 (1861) 117–.
Anon. [1865] (XI) Smiths. Rp. (1867) 313–.
Bradley, L. Am. As. P. 15 (1866) 23–.
Zaliwski-Mirorski, —. C. R. 62 (1866) 827–.
Krause, C. Brünn Vh. 6 (1867) (*Sb.*) 19–.
Hough, G. W. [1868] Alb. I. T. 6 (1870) 136–.
Savary, —. C. R. 68 (1869) 966–.
Casamajor, P. Am. C. 2 (1872) 241–; 3 (1873) 4–.
Highton, H. [1872] Phm. J. 3 (1873) 505–.
Vlacovich, N. Trieste Bll. 1 (1875) 129–.
Du Moncel, T. A. L. Lum. Élect. 2 (*1880) 71–, 89–.
Ledeboer, P. H. Lum. Élect. 17 (1885) 115–, 209–, 537–.
Walter, J. J. Pr. C. 31 (1885) 527–.
Walker, S. F. Elect. 18 (1887) 243–, 264–.
Hankel, W. G. Leip. Mth. Ps. B. 41 (1889) 378–.
Meissen, E. Cztg. Opt. 12 (1891) 149–, 162–, 172–.
Goodwin, H. M. Z. Ps. C. 13 (1894) 577–.
Voisenat, J. A. Tél. 23 (1896–97) 209–.

CHRONOLOGICAL LIST OF SOME CELLS.

Volta. (Pile and *couronne des tasses.*) Phil. Trans. (1800) 403–. (*See* Construction.)
Maréchaux. Gilbert A. 22 (1806) 318–. (*See* Dry Cells.)
De Luc. Nicholson J. 26 (1810) 113–, 241–. (*See* Dry Cells.)
Zamboni. Brugnatelli G. 5 (1812) 424–; 7 (1814) 220–, 444–. (*See* Dry Cells.)
Jäger. Gilbert A. 50 (1815) 214–; 52 (1816) 81–. (*See* Dry Cells.)
Hare. (Calorimotor.) Silliman J. 3 (1821) 105–. (*See* Construction.)
Hare. (Deflagrator.) Silliman J. 4 (1822) 201–. (*See* Construction.)
Pepys. QJ. Sc. 15 (1823) 143. (*See* Construction.)
Runge. Pogg. A. 16 (1829) 129–. (*See* Construction.)
Callan. (1-Liquid.) Ph. Mg. 9 (1836) 472–. (*See* Construction.)
Daniell. Phil. Trans. (1836) 107–, 125–. (*See* 2-Liquid Cells.)
Mullins. R. S. P. 3 (1836) 410. (*See* Constant Cells.)
Grove. Ph. Mg. 15 (1839) 287–. (*See* 2-Liquid Cells.)

Smee. Ph. Mg. 16 (1840) 315–. (*See* Construction.)
Sturgeon. Sturgeon A. Electr. 5 (1840) 66–. (*See* Construction.)
Bunsen. Lieb. A. 38 (1841) 311–. (*See* 2-Liquid Cells.)
Gassiot. (Water battery.) Phil. Trans. (1844) 39–. (*See* Construction.)
Callan. (2-Liquid.) Ir. Ac. P. 4 (1850) 152–. (*See* 2-Liquid Cells.)
Pulvermacher's chain. (*Walenn, W. H.*) B. A. Rp. (1851) (*pt.* 2) 52–. (*See* Construction.)
Callan. Ph. Mg. 9 (1855) 260–. (*See* Construction.)
Meidinger. Heidl. Vh. Nt. Md. (1857–59) 136–. (*See* Constant Cells.)
Secchi. N. Cim. 9 (1859) 316–. (*See* Constant Cells.)
Minotto. (*Brugo, P.*) Polli A. 38 (1864) 378–. (*See* Constant Cells.)
De la Rue and Müller. C. S. J. 6 (1868) 488–. (*See* Constant Cells.)
Leclanché. (Patent, 1868.) (*See* Construction.)
Thomson, Sir W. (Tray battery.) R. S. P. 19 (1871) 253–. (*See* Daniell Cells.)
Trouvé. C. R. 77 (1873) 1551. (*See* Daniell Cells.)
Lalande. (*Lalande, F. de, & Chaperon, G.*) C. R. 97 (1883) 164–. (*See* Copper Oxide Cells.)
Radiguet. (*Valette, H.*) Les Mondes 7 (1884) 577–. (*See* Constant Cells.)
Pollak's (regenerative). (*Anon.*) Tel. J. 19 (1886) 105–. (*See* Construction.)
Mond-Langer. R. S. P. 46 (1890) 296–. (*See* Gas Batteries.)

CONSTRUCTION.

(Pile.) *Volta, A.* J. de Ps. 51 (1800) 344–.
(— and *couronne des tasses*, physiological experiments.) *Volta, A.* Phil. Trans. (1800) 403–.
(Volta's pile.) *Nicholson, W.* [1800] Nicholson J. 4 (1801) 179–.
(Pile of 600 pairs, experiments.) *Müller, Hein.* Gilbert A. 7 (1801) 134–; 10 (1802) 372–.
(—, action and sparks.) *Gilbert, L. W.* Gilbert A. 7 (1801) 157–.
(—.) *Arnim, L. A. von.* Gilbert A. 8 (1801) 163–, 257–.
(Piles with different metals and solutions.) *Einhof, H.* Gilbert A. 8 (1801) 316–.
Vassalli-Eandi, A. M. [1801] Turin Mm. Ac. (1802–03) 123–.
(Pile.) *Wolff, —.* Gilbert A. 8 (1801) 498–.
(—, economical.) *Lüdicke, M. A. F.* Gilbert A. 9 (1801) 119–.
(Galvanic combinations composed of animal substances.) *Davy, (Sir) H.* R. I. J. 1 (1802) 284–.
(Air instead of moist substances between plates.) *Dyckhoff, —.* Voigt Mg. 4 (1802) 791–.
(Pile with zinc and molybdenum sulphide.) *Maréchaux, P. L.* Gilbert A. 10 (1802) 378; 11 (1802) 123–.
(Pile with 495 pairs.) *Grimm, J. K. P.* Gilbert A. 11 (1802) 222–.
(— — NaCl or NH_4Cl.) *Volta, A.* (VI *Adds.*) V. Mons J. C. 1 (1802) 129–.
Brugnatelli, L. V. (VI *Adds.*) V. Mons J. C. 1 (1802) 323–.
(Pile.) *Westrumb, J. F.* Crell C. A. 2 (1802) 306–.
(— with NaCl or NH_4Cl and porcelain rings round Zn.) *Alizeau, —.* J. de Ps. 57 (1803) 75–.
(60 pairs of Zn and Cu plates with thin layer of NaCl solution between them in trough.) *Erdmann, J. F. von.* Gilbert A. 12 (1803) 458–.
Hauff, J. K. F. Gilbert A. 15 (1803) 77–.
(Pile, charge at each pair measured by electrometer.) *Negro, S. dal.* Mod. Mm. S. It. 11 (1804) 623–.
(—, Zn, Fe, Ag.) *Hildebrandt, G. F.* Gilbert A. 30 (1808) 67–.
(Piles.) *Forster, B. M.* Tilloch Ph. Mg. 47 (1816) 265–.
(Immersing plates simultaneously.) *Pepys, W. H.* QJ. Sc. 1 (1816) 193–.
(Cell with 2 zinc plates of different sizes and conditions.) *Örsted, H. C.* Schweigger J. 33 (=*Jb.* 3) (1821) 163–.
(Coiled copper and zinc plates 50 feet by 2 feet.) *Pepys, W. H.* QJ. Sc. 15 (1823) 143.
(Zn – acid [or salt] – Cu in U tubes.) *Castellet, — de.* Aix Mm. Ac. (1827) 275–.
Greenhow, R. QJ. Sc. (1829) (*Pt.* 2) 71–.
(1 metal and no liquid. 60 to 80 plates of Zn polished on one side, polished sides turned in one direction. Electroscope shows opposite charges at the ends.) *Watkins, F.* Gill Tech. Mcr. Rep. 6 (1830) 154.
Negro, S. dal. A. Sc. Lomb. Ven. 2 (1832) 109–.
Pfaff, C. H. Pfaff Mt. (1836) (*Hft.* 9 & 10) 53–.
Shillibeer, J. Sturgeon A. Electr. 1 (1836–37) 224–.
(Influence of interposed pairs.) *Buff, H.* Lieb. A. 32 (1839) 7–.
(Method of holding plates in trough.) *Hoskins, S. E.* [1839] Sturgeon A. Electr. 4 (1839–40) 64–.
(5 cells of a form of Grove.) *Schönbein, C. F.* Pogg. A. 49 (1840) 511–, 589–.
(Method of strengthening pile by graphite.) *Muncke, G. W.* Pogg. A. 53 (1841) 276.
Münch, —. Fr. Cg. Sc. (1842) 95–.
Delarive, A. Arch. de l'Électr. 3 (1843) 112–.
Matteucci, C. Pisa Misc. Md. Chir. (1843) (*pte.* 2) 18–.
Schönbein, C. F. Basel B. 5 (1843) 90–.
Leuchtenberg, M. (Herzog) von. St. Pét. Ac. Sc. Bll. 4 (1845) 69–.
(Zn – acid – coil of platinised silver wire. Coil of copper wire in porous pot and another outside, when sulphuric acid soaks through, a current is produced.) *Pring, J. H.* Walker Electr. Mg. 1 (1845) 441–.
Majocchi, G. A. At. Sc. It. (1846) 288–.

(Zn coated with Hg and Pb – H_2SO_4 + $FeSO_4$ – cast iron plate.) *Walenn, W. H.* B. A. Rp. (1849) (*pt.* 2) 45–.
Wright, T. Edinb. M. J. Md. Sc. 9 (1849) 22–.
Schäfer, J. H. (VIII) Arnhem Ntk. 6 (1850) 149–.
Thury, [J. M. A.] Gen. I. Nt. Bll. 1 (1853) 32–.
Magrini, L. Mil. At. I. Lomb. 1 (1858) 390–; Rm. Cor. Sc. 6 (1863) 123–.
(Fe – H_2SO_4 – C; Zn – $FeSO_4$ – C; Zn – $(NH_4)_2CO_3$ – C.) *Monthiers, —.* C. R. 63 (1866) 332–.
(Comparison of different forms.) *Coffin, W. H.* C. N. 24 (1871) 231–.
(Forms for telegraphy.) *Bennett, A. R.* Tel. E. J. 4 (1875) 175–.
Olszewski, K. (XII) Krk. Ak. (*Mt.-Prz.*) Rz. & Sp. 2 (1875) 42–, XL–.
Partz, A. Lum. Élect. 3 (*1881) 168–.
Rothen, —. J. Tél. 9 (1885) 21–, 45–.
Pabst, C. Humb. 5 (1886) 466–.
Friedrichs, F. A. Ps. C. 32 (1887) 191–.
Gréhant, N. Par. S. Bl. Mm. 40 (1888) (*C. R.*) 697–.
Spaczynsky, —. Fschr. Ps. (1889) (*Ab.* 2) 459.
Dudley, C. B., & Pease, F. N. Railroad & Eng. J. 64 (1890) 361–.
Henrichsen, S. N. Ts. Fs. K. 2 (1897) 180–.
Petersen, E. [1898] Z. Elektch. (1898-99) 261–.
Action, destructive, on pasteboard. *Brugnatelli, L. V.* Brugnatelli G. 1 (1808) 146.
Alkaline battery. *Fabri, R., & Ravaglia, G.* Lum. Élect. 13 (1884) 8–.
— —. *Rovelli, C.* Rv. Sc.-Ind. 21 (1889) 223–.
— copper battery. *Rovelli, C.* Rv. Sc.-Ind. 22 (1890) 126–.
Aluminium cell. *Fossati, E.* Rv. Sc.-Ind. 23 (1891) 241–.
— sulphate battery. *Zegers, L. L.* Santiago de Chile Un. A. 67 (1885) 5–.
Arrangement for rapidly filling and emptying cells. *Almeida, J. C. d'.* C. R. 71 (1870) 774–.
Automatic battery, improvements. *Marinovitch, B.* Lum. Élect. 26 (1887) 351–.
—, —, O'Keenan's. *Marinovitch, B.* Lum. Élect. 23 (1887) 314–.
— system of feeding, Larochelle's. *Mareschal, G.* Les Mondes 7 (1884) 575–.

BICHROMATE CELLS.

(Exciting liquid introduced drop by drop and waste liquid passing away continuously.) *Russell, H. C.* Ph. Mg. 5 (1878) 201–.
(Zn – H_2SO_4 + $K_2Cr_2O_7$ – C.) *Du Moncel, T. A. L.* Lum. Élect. 3 (*1881) 193–.
Weiler, W. [1898] Sc. Abs. 2 (1899) 694.
and cells with automatic immersion of zinc. *Thiry, —.* Brux. S. Sc. A. 20 (1896) (*Pt.* 1) 27.
experiments. *Du Moncel, T. A. L.* Lum. Élect. 6 (*1882) 433–.
modification for electric lighting. *Trouvé, G.* C. R. 96 (1883) 787–, 1048.
— — — —, Trouvé's. *Hospitalier, É.* Par. S. Ps. Sé. (1883) 99–.
pneumatic, liquid brought in contact with plates by air pressure when required. *Pillet, —.* As. Fr. C. R. (1886) (*Pt.* 1) 98.
sodium bichromate (compared with potassium dichromate in 1- and 2-liquid cells). *Harding, S. L.* Am. J. Sc. 33 (1887) 61–.
— —. *Fortin, —.* Rv. Sc.-Ind. 20 (1888) 282.
— —. *Kazankin, N. P.* Kazan S. Nt. (*Ps.-Mth.*) P. 7 (1889) 403–.

Borchers's cell (Zn [or Sn] – NaOH + $NaNO_3$ + NaCl – Fe). *Anon.* Dingler 263 (1887) 32–.
Bremser's battery for the apparently dead. *Erdmann, J. F. von.* Gilbert A. 12 (1803) 450–.
Byrne's pneumatic battery (Zn – H_2SO_4 + $K_2Cr_2O_7$ – Pt; air pumped in). *Preece, W. H.* Tel. E. J. 7 (1878) 382–.
Callan's battery (Zn – acid – Cu. Large plates and mode of connecting them). *Callan, N. J.* Ph. Mg. 9 (1836) 472–.
— — (Zn – H_2SO_4 – cast iron cell). *Callan, N. J.* Ph. Mg. 9 (1855) 260–.
Calorimotor (Zn – acid – Cu [very large plates]). *Hare, R.* Silliman J. 1 (1818) 413–; 3 (1821) 105–.
Carbon battery (Zn – H_2SO_4 – bituminous coal). *Gibbs, O. W.* Sturgeon A. Electr. 5 (1840) 395–.
— boron battery (Zn and carbon prepared in some way with boron). *Warren, H. N.* C. N. 71 (1895) 2.
— cylinders, preparation. *M'Culloch, J. B.* Walker Electr. Mg. 1 (1845) 360–.
—, gas-, use. *Sauvage, H.* A. Tél. 2 (1875) 345–.
—, 2 kinds, and 1 liquid. *Griffiths, T.* QJ. Sc. 17 (1824) 174–.
— plate, negative, effect of carbon powder. *Du Moncel, T.* [*A. L.*] C. R. 75 (1872) 876–.
—, platinised, exposed to air – NaCl | NaCl – C in PbO_2. *Tommasi, D., & Radiguet, —.* C. R. 99 (1884) 129–; A. Tél. 12 (1885) 453–.
—, use. *Cooper, J. T.* (VI *Adds.*) Ph. Mg. 16 (1840) 35–.

CARBON-CONSUMING CELLS.

Schenck, R. Z. Nw. 67 (1894) 364–.
Vogel, F. Elekttech. Z. 16 (1895) 556.
Krieger, —. Civing. 42 (1896) 3–.
Reed, —. [1896] Z. Elektch. (1896–97) 121–.
Blount, B. Elect. 38 (1897) 121–.
Case, W. E. Elect. 39 (1897) 688–.
Weber, C. L. Elekttech. Z. 18 (1897) 112–.
Tommasi, D. Elect. Rv. 44 (1899) 793–.
carbon in fused nitrates. *Brard, (Dr.) —.* As. Fr. C. R. 11 (1882) 244–; C. R. 95 (1882) 890–, 1158–.

carbon in fused nitre. *Jablochkoff, P.* C. R. 85 (1877) 1052–.
—, oxidation by chlorine peroxide. *Anon.* Tel. J. 21 (1887) 283.
—, — in the cold. *Bartoli, A., & Papasogli, G.* N. Cim. 12 (1882) 141–; Gz. C. It. 14 (1885) 85–.
coal, electricity direct from (Short's cell). *Reed, C. J.* Sc. Abs. 1 (1898) 343.
—, — — —. *Bamber, E. F.* Nt. 62 (1900) 437.
Jacques's. *Anon.* Elect. 36 (1896) 768–.
—. *Reed, C. J.* [1897–98] Sc. Abs. 1 (1898) 340, 341, 342, 343, 419–, 421, 422.
—. *Case, W. E.* [1897] Sc. Abs. 1 (1898) 340–.
—. *Anthony, W. A.* [1897–98] Sc. Abs. 1 (1898) 341, 342, 343, 419, 420, 421–.
—. *Thomson, E.* [1897] Sc. Abs. 1 (1898) 420.
—. *Langley, J. W.* Franklin I. J. 146 (1898) 224–.
—. *Ostwald, W.* Sc. Abs. 1 (1898) 420–.
—. *Skinner, S.* B. A. Rp. (1898) 804.
—. *Thomsen, J.* Sc. Abs. 1 (1898) 422.
possibilities. *Cooper, W. R.* [1898] Sc. Abs. 3 (1900) 329.
thermochemical. *Korda, D.* Mth. Termt. Éts. 13 (1895) 203–; C. R. 120 (1895) 615–; Elekttech. Z. 16 (1895) 272.
and voltaic action. *Reed, C. J.* [1899] Sc. Abs. 3 (1900) 91.

Cast iron battery (Zn amalgamated – H_2SO_4 – cast iron cylinder). *Sturgeon, W.* Sturgeon A. Electr. 5 (1840) 66–.
— — —, Maynooth, modification. *Symons, W.* B. A. Rp. (1856) (*pt.* 2) 16–.
Cell with circulating liquid. *Fiorina, G.* Rv. Sc.-Ind. 22 (1890) 247–.
Cells depending on atmospheric oxidation (Cu – NH_4OH – Pt in air). *Wright, C. R. A., & Thompson, C.* R. S. P. 42 (1887) 212–; 44 (1888) 182–.
— — — neutralisation. *Wright, C. R. A., & Thompson, C.* R. S. P. 43 (1888) 489–.
— with fused electrolytes. *Poincaré, L.* C. R. 110 (1890) 339–.
— — — — (historical note). *Becquerel, H.* C. R. 110 (1890) 444–.
— — — —. *Brown, J.* [1892] R. S. P. 52 (1893) 75–.
— — — —, and gaseous depolariser. *Swan, J. W.* R. S. P. 56 (1894) 56–.
— — solid electrolytes (Ag – CuS + S – Cu; Ag – AgS + CuS – Cu). *Bidwell, S.* Nt. 32 (1885) 345.
Charging, apparatus for rapid. *Lachinov, D. A.* (XII) Rs. C. Ps. S. J. 5 (*Pt.* 1) (1873) 115–.
Chemico-mechanical battery (Zn – acid – platinised platinum, coke or silver), and galvanic properties of elementary bodies. *Smee, A.* Ph. Mg. 16 (1840) 315–.
Chlorine battery, Upward's (Zn – H_2O | $ZnCl_2$ – C plates and crushed. Cl passed through). *Anon.* Tel. J. 18 (1886) 569, 592–.
— —, —. *Dierman, W.* Tel. J. 19 (1886) 51.
Circulating battery, Erhard's. *Feuerlein, O.* [1886] Tel. E. J. 16 (1888) 162.

CONSTANT CELLS.

(HNO_3 – KOH in tube filled with clay.) *Becquerel, A. C.* C. R. 4 (1837) 35–.
(Zn – H_2SO_4 | $K_2Cr_2O_7$ – Cu.) *Walker, C. V.* [1842] L. Electr. S. P. (1843) 204–.
(Zn – NaCl | $CuSO_4$ – Cu, and chemical effects.) *Pinaud, A.* Toul. Mm. Ac. 2 (1846) 169–.
(Zn – hydrogen potassium tartrate | $CuSO_4$ – Cu.) *Eisenlohr, W.* Pogg. A. 78 (1849) 65–.
(Zn amalgamated – $ZnSO_4$ – Zn.) *Osann, G.* Würzb. Vh. 2 (1852) 62–.
(Liquids kept of constant composition.) *Bouchotte, Émilien.* Metz Mm. Ac. 39 (1857–58) 557–.
(Prevention of deposition of copper on zinc.) *Secchi, A.* N. Cim. 9 (1859) 316–.
Siemens, W. Tel. Vr. Z. 6 (1859) 53–.
Figuier, —. (VII) Mm. Md. Mil. 8 (1862) 464–.
(Flask of $CuSO_4$ inverted in cell.) *Houdin, R.* Les Mondes 11 (1866) 184–.
(Zn – NH_4Cl – Hg_2Cl_2.) *Héraud, A.* C. R. 88 (1879) 124–; A. C. 17 (1879) 512–.
Mocenigo, (conte) G. (XII) Rv. Sc.-Ind. 13 (1881) 122–, 236–.
(Zn – H_2SO_4 + $K_2Cr_2O_7$ liquid flowing through cell.) *Carpentier, J.* C. R. 100 (1885) 849–.
(C – fused NaOH – Pt coated with sodium platinate.) *Fabingi* [? *Fabinyi*], —, *& Farkas*, —. C. R. 106 (1888) 1597–.
Bagration's (Zn – Cu – in earth saturated with NH_4Cl). *Jacobi, M. H.* [1843] St. Pét. Ac. Sc. Bll. 2 (1844) 188–.
Callaud's. *Bolton, W.* [1895] Z. Elektch. (1895–96) 5–.
—, with copper sulphate and copper chloride. *Cailleret, H.* A. Tél. 4 (1877) 306–.
— and Marié-Davy's. *Bouquilliard, C.* A. Tél. 4 (1877) 300–.
— — — and Leclanché's, comparison. *Caël, E.* A. Tél. 6 (1879) 10–.
constant acid battery. *Walker, C. V.* [1841] L. Electr. S. P. (1843) 26–.
copper carbon (Cu – H_2SO_4 | $K_2Cr_2O_7$ + H_2SO_4 – C). *Thomsen, J.* Pogg. A. 111 (1860) 192.
— and cast iron (Fe – NaCl | $CuSO_4$ – Cu). *Ryhiner, H.* Dingler 110 (1848) 418–.
diaphragm-, and new form of negative element (Cu deposited on copper wire gauze). *Walker, C. V.* [1841] L. Electr. S. P. (1843) 114–.
economical (Zn – NaCl in brown paper – $CuSO_4$ – Cu). *Mackrell, G.* (VI *Adds.*) Electr. S. P. (1837–40) 194–, 201–.
— (Zn amalgam – H_2SO_4 – silvered and platinised muslin). *Page, C. G.* Silliman J. 13 (1852) 257–.
effects, electrical. *Zantedeschi, F.* Ven. At. 3 (1844) 311–.
— of temperature. *Crosse, A.* [1838] Electr. S. T. (1837–40) 47–.
for electric telegraphy, use of different excitants. *Zantedeschi, —.* Zantedeschi A. Fis. (*1849–50) 315.

experiments, and comparison of various types. *Louyet, P.* Brux. Ac. Bll. 16 (1849) 613–.
with high E.M.F. ($Zn - NaOH \mid K_2Cr_2O_7 + H_2SO_4 - C$). *Morisot, —.* C. R. 121 (1895) 251–.
improvement. *Clarke, E. S.* [1838] Sturgeon A. Electr. 3 (1838–39) 85–, 314–.
Meidinger's. *Meidinger, H.* Heidl. Vh. Nt. Md. (1857–59) 136–; Pogg. A. 108 (1859) 602–.
—, improvement. *Pincus, (Dr.)* —. Berl. Tel.-Vr. Z. 14 (*1867) 218–.
—, of different types. *Krakau, A. A.* Rs. Ps.-C. S. J. 24 (*C.*) (1892) 325–; C. S. J. 64 (1893) (*Abs., Pt.* 2) 355.
method of rendering cell constant. *Magrini, L.* A. Sc. Lomb. Ven. 7 (1837) 99–.
Minotto's. *Brugo, P.* Polli A. 38 (1864) 378–.
Mullins's ($Zn - H_2SO_4 + HNO_3 \mid CuSO_4 - Cu$). *Mullins, F. W.* R. S. P. 3 (1836) 410; Sturgeon A. Electr. 1 (1836–37) 205–.
— ($Zn - NH_4Cl \mid CuSO_4 - Cu$). *Sturgeon, W.* Sturgeon A. Electr. 1 (1836–37) 107–.
with nitric acid and potassium bichromate. *Desruelles, L.* A. Tél. 12 (1885) 174–.
permanganate, with high E.M.F. *Vohwinkel, E.* Dingler 256 (1885) 218–.
portable (dipped in excitant and exposed to air). *Pulvermacher, J. L.* C. R. 45 (1857) 1047–.
powerful. *Poggendorff, J. C.* Pogg. A. 51 (1840) 384–.
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—, —, inaction in acidulated water. *Grove, W. R.* Ph. Mg. 15 (1839) 81–; C. R. 8 (1839) 1023–.
—, amalgamation. *Demance, E.* C. R. 65 (1867) 1086–.
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—, — for Faraday cells. *Liebig, J. von.* Lieb. A. 29 (1839) 111–.
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— — — spirals. *Michelotti, V.* Tor. Mm. Ac. 26 (1821) 433–.
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— — — — — — (Runge). *Kastner, K. W. G.* Kastner Arch. C. 2 (1830) 243–.
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5630 Ohm's Law. Divided Currents and Networks of Linear Conductors.

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— — for telephonic purposes. *Dejongh, A.* Lum. Élect. 4 (*1881) 156–.
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(Experimental measurement for Brit. Ass. Comm.) *Maxwell, J. C., & Jenkin, F.* B. A. Rp. 34 (1864) 350–.
(Reproduction of standards by chemical means.) *Matthiessen, A., & Hockin, C.* B. A. Rp. 34 (1864) 352–.
Jenkin, F. R. S. P. 14 (1865) 154–.
(Ohm, copies.) *Matthiessen, A., & Hockin, C.* B. A. Rp. 35 (1865) 311–.
(Comparison of various units, Kew.) *Hockin, C.* B. A. Rp. 37 (1867) 483.
(— — — —.) *Chrystal, G., & Saunder, S. A.* B. A. Rp. (1876) 13–.
(Construction and issuing practical standards.) *Brit. Ass. Comm.* B. A. Rp. (1881) 423–; (1882) 70–; (1883) 41–; (1884) 29–; (1885) 31–; (1886) 145–; (1887) 206–; (1888) 55–; (1889) 41–; (1890) 95–; (1891) 152–; (1892) 132–.
(Values of some coils.) *Glazebrook, R. T., & Fitzpatrick, T. C.* B. A. Rp. (1886) 147–.
(Permanence of original B.A. standards and other standard coils.) *Glazebrook, R. T., & Fitzpatrick, T. C.* B. A. Rp. (1888) 56–.
(Values of certain coils.) *Glazebrook, R. T.* B. A. Rp. (1890) 98–; (1892) 150–.
(Wire standards.) *Lindeck, S.* B. A. Rp. (1892) 139–.
(Certain resistance coils.) *Glazebrook, R. T.* B. A. Rp. (1892) 152–.
(Comparison with Berlin standards.) *Glazebrook, R. T.* B. A. Rp. (1892) 154–.
(Construction, improvement, experiments.) *Brit. Ass. Comm.* B. A. Rp. (1893) 127–; (1894) 117–; (1895) 195–; (1896) 150–; (1897) 206–; (1898) 145–; (1899) 240–; (1900) 53–.
(Effects of heating due to testing-currents.) *Glazebrook, R. T.* B. A. Rp. (1893) 136–.
(Low resistance.) *Jones, J. V.* B. A. Rp. (1893) 137–.
(Comparison with standards used by Prof. Jones.) *Glazebrook, R. T.* B. A. Rp. (1894) 128–.
(— of ohm standards of the Board of Trade.) *Rennie, J.* B. A. Rp. (1894) 130.
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— standards of Physikalisch-Technische Reichsanstalt, comparison. *Lindeck, S.* Z. Instk. 16 (1896) 272–.

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—. *Morris, D. K.* Elect. 33 (1894) 605–, 627–, 667–.
— and adjustment. *Dehms, F.* Berl. Z. Tel. 14 (1867) 4–.
— — —. *Willyoung, E. G.* Franklin I. J. 133 (1892) 309–.
—, improvements. *Levy, M.* Elekttech. Z. 20 (1899) 677–.
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German-silver and platinoid wires, failure. *Appleyard, R.* [1897] L. Ps. S. P. 16 (1899) 17–; Ph. Mg. 45 (1898) 157–.
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— resistances. *Wolff, O.* Z. Instk. 18 (1898) 19–.
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megohm. *Davids, R. W.* Franklin I. J. 131 (1891) 311–.
—, carbon, for high voltages. *Mordey, W. M.* Ph. Mg. 42 (1896) 450–.
—, inexpensive. *Jona, E.* Nt. 48 (1893) 155.
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—, construction. *Salvioni, E.* Rm. R. Ac. Linc. Mm. 6 (1889) 267–.
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—, — — — —. *Jaeger, W., & Kahle, K.* Berl. Ps. Reichsanst. Ab. 3 (1900) 95–.
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— — — —. *Feussner, K., & Lindeck, S.* Berl. Ps. Reichsanst. Ab. 2 (1895) 501–; Z. Instk. 15 (1895) 394–, 425–.
— — — —. *Lamotte, M.* Éclair. Élect. 7 (1896) 245–.
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— — — —, construction. *Feussner, K.* Z. Instk. 10 (1890) 6–, 425–.
platino-silicon. *Rodt, V.* Elekttech. Z. 21 (1900) 847–.
platinum-iridium wires, etc. *Klemenčič, I.* Wien Ak. Sb. 97 (1889) (*Ab.* 2*a*) 838–.

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(Proposed reproducible standard.) *Siemens, W.* Pogg. A. 110 (1860) 1–.
Siemens, W. A. Ps. C. 127 (1866) 327–.
(Siemens.) *Matthiessen, A.* Ph. Mg. 31 (1866) 376–.
(—.) *Jenkin, F.* Ph. Mg. 32 (1866) 161–.
Kohlrausch, F. Gött. Nr. (1882) 654–.
construction. *Lindeck, S.* Z. Instk. 11 (1891) 171–.
reconstruction. *Dehms, F.* A. Ps. C. 136 (1869) 260–, 373–.
—. *Siemens, E. W. von, & Halske, J. G.* (XII) Elekttech. Z. 3 (1882) 408–.
—. *Strecker, K.* [1884–85] Würzb. Ps. Md. Sb. (1884) 73–; Münch. Ak. Ab. 15 (1886) 367–.
—. *Passavant, H.* A. Ps. C. 40 (1890) 505–; 46 (1892) 336.
of Siemens and Halske. *Raps, A.* Z. Instk. 16 (1896) 22–.
value of some standards. *Glazebrook, R. T.* L. Ps. S. P. 11 (1892) 159–; Ph. Mg. 32 (1891) 70–.

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Carpentier. *Guerout, A.* Lum. Elect. 12 (1884) 166–.
for large currents. *Snell, W. H.* Elect. 14 (1885) 240–.
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— — (Milthaler). *Lindeck, S.* A. Ps. C. 46 (1892) 515–.
— — (—). *Wiechert, E.* A. Ps. C. 52 (1894) 67–.
—. *Walker, E. O.* Elect. 35 (1895) 773.
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—. *Crawley, C. W. S.* Elect. 40 (1898) 132–.
self-induction and capacity in, influence on magnetic phenomena. *Fromme, C.* Gött. Nr. (1894) 154–.
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winding of coils for measurements with alternating currents. *Chaperon, G.* C. R. 108 (1889) 799–.
—, theory. *Chaperon, G.* Par. S. Ps. Sé. (1889) 92–.
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— — — — (low). *Housman, R. H.* Elect. 40 (1898) 300–.

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Weber, W. E. Pogg. A. 82 (1851) 337–.
Rowland, H. A. Am. J. Sc. 15 (1878) 281–, 325–, 430–.
(Wires.) *Rɔiti, A.* [1884] Tor. Ac. Sc. At. 19 (1883) 643–.
Himstedt, F. A. Ps. C. 31 (1887) 617–; Giessen Oberh. Gs. B. 30 (1895) 177–.
Jones, J. V. [1895] R. I. P. 14 (1896) 601–.
Glazebrook, R. T. L. Ps. S. P. 17 (1901) 329–; Ph. Mg. 50 (1900) 410–.
ampère, redetermination in terms of electrochemical equivalent of silver. *Carhart, H. S.* Am. As. P. (1898) 101–.
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— — — —. *Duncan, L., Wilkes, G., & Hutchinson, C. T.* Am. J. Sc. 38 (1889) 230–.
experiments. *Rayleigh, (Lord).* [1882] Phil. Trans. 173 (1883) 661–.
—. *Glazebrook, R. T., & Dodds, J. M.* [1882] Phil. Trans. 174 (*1884) 223–.
—. *Glazebrook, R. T., & Sargant, E. B.* [1882] Phil. Trans. 174 (*1884) 252–.
final value as determined by American Committee. *Rowland, H. A.* Nt. 36 (1887) 549.
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electrodynamic measurements. *Weber, W. E.* Leip. Ab. Mth. Ps. 1 (1852) 197–.
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kilohm. *Guillet, A.* Éclair. Elect. 20 (1899) 161–, 212–, 288–, 328–, 376–; J. de Ps. 8 (1899) 471–.

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Lippmann, G. C. R. 93 (1881) 713–.
(Lippmann.) *Brillouin, M.* C. R. 93 (1881) 845–, 1069–.
(Brillouin.) *Lippmann, G.* C. R. 93 (1881) 955–; 94 (1882) 36–.
Perry, J., & Ayrton, W. E. A. Tél. 8 (1881) 209–.
Rayleigh, (Lord), & Schuster, A. R. S. P. 32 (1881) 104–.
Joubert, J. C. R. 94 (1882) 1519–.
Lippmann, G. Par. S. Ps. Sé. (1882) 121–.
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Rɔiti, A. [1882] Tor. Ac. Sc. At. 17 (1881) 588–.
Wiedemann, G. H. A. Tél. 9 (1882) 393–.
Blavier, E. E. A. Tél. 9 (1882) 560–; 10 (1883) 59–.
Brillouin, M. C. R. 96 (1883) 190–; J. de Ps. 2 (1883) 149–.
Himstedt, F. [1884] Freiburg B. 8 (1885) 258–.
Mengarini, G. Rm. R. Ac. Linc. T. 8 (1884) 318–.
Giese, W. Elekttech. Z. 6 (1885) 48–.
Himstedt, F. Berl. Ak. Sb. (1885) 753–; Freiburg B. 1 (1886) 1–.
(Himstedt.) *Rayleigh, (Lord).* Ph. Mg. 21 (1886) 10–.
(Rayleigh.) *Himstedt, F.* A. Ps. C. 28 (1886) 338–.
Dorn, E. Berl. Ak. Sb. (1888) 731–; A. Ps. C. 36 (1889) 22–, 398–.
Jones, J. V. Elect. 25 (1890) 552–.
Wiedemann, G. A. Ps. C. 42 (1891) 227–, 425–.
Fessenden, R. A. Nt. 59 (1898–99) 605–.
by damping. *Baille, J. B.* A. Tél. 11 (1884) 89–, 224–.
— —. *Mascart, É. É. N.* C. R. 100 (1885) 309–, 701; J. de Ps. 4 (1885) 101–.
— —. *Rayleigh, (Lord).* A. Ps. C. 24 (1885) 214–.
dynamometric method. *Fröhlich, I.* (XII) Mth. Term. Éts. 1 (1883) 92–; Mth. Nt. B. Ung. 1 (1882–83) 91–.
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— — (Lippmann). *Wuilleumier, H.* C. R. 106 (1888) 1590–; Par. S. Ps. Sé. (1889) 168–.
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by Lorenz's apparatus, Montreal. *Ayrton, W. E., & Jones, J. V.* B. A. Rp. (1897) 212–.
mercury, experiments. *Mascart, É., Nerville, F. de, & Benoît, R.* C. R. 98 (1884) 1034–; Lum. Élect. 12 (1884) 316–, 357–, 396–, 431–, 476–, 509–; 13 (1884) 33–, 69–, 110–; Par. S. Ps. Sé. (1884) 123–; A. C. 6 (1885) 5–.
—, and Siemens's unit (International Conference of Electricians). *Weber, H. F.* Lum. Élect. 13 (1884) 150–, 191–, 231–, 273–, 310–, 351–.
method founded on induction by displacement of magnet. *Lippmann, G.* C. R. 95 (1882) 1154–.
relation of self-induction to. *Rayleigh, (Lord).* Nt. 32 (1885) 7.
by rotating coil. *Wiedemann, G.* Berl. Ak. Ab. (1884) *No.* 3, 75 pp.
thermoscopic method. *Lippmann, G.* C. R. 95 (1882) 634–.
Wiedemann's measurement, recalculation. *Peter, A.* Leip. Mth. Ps. B. 46 (1894) 138–.

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Sabine, R. Ph. Mg. 25 (1863) 161–.
Dehms, F. Berl. Z. Tel. 15 (1868) 13–.
Kohlrausch, F. [1870] A. Ps. C. (*Ergänz.*) 6 (1874) 1–.
Lorenz, L. Kjöb. Ov. (1873) 67–; A. Ps. C. 149 (1873) 251–.
(Kohlrausch.) *Rowland, H. A.* Ph. Mg. 50 (1875) 161–.
(—.) *Stolyetov, A. G.* (XII) Rs. C. Ps. S. J. 7 (*Ps.*) (1875) [(*Pt.* 1)] 266–; (XI) Ph. Mg. 50 (1875) 404–.
Dorn, E. A. Ps. C. 17 (1882) 773–.
Kohlrausch, F. [1888] Münch. Ak. Sb. 18 (1889) 3–; Münch. Ak. Ab. 16 (1888) 627–.
Glazebrook, R. T. Elect. 25 (1890) 543–.
Jones, J. V. [1890] Phil. Trans. (A) 182 (1892) 1–.
Guillaume, C. É. Par. S. Ps. Sé. (1891) 54–.
calculation. *Guillaume, C. É.* Lum. Élect. 27 (1888) 323–.
—. *Weinstein, —.* Elekttech. Z. 9 (1888) 25–.
electromagnetic measure. *Weber, H. F.* Zür. Vjschr. 22 (1877) 273–.
— —. *Wild, H.* [1883] St. Pét. Ac. Sc. Mm. 32 (*1885) *No.* 2, 122 pp.
— — (Wild). *Kohlrausch, F.* A. Ps. C. 23 (1884) 344–.
— —. *Wild, H.* A. Ps. C. 23 (1884) 665–; Lum. Élect. 13 (1884) 390–, 430–, 472–, 514–; 14 (1884) 34–, 73–, 112–, 153–, 192–, 233–, 272–, 313–, 355–.
— —. *Lorenz, L.* [1885] Kjøb. Dn. Vd. Selsk. Skr. 2 (1881–86) 309–; Lum. Élect. 16 (1885) 437–, 486–, 534–.
— — (Kohlrausch). *Wild, H.* A. Ps. C. 24 (1885) 209–.

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Jacobi, M. H. St. Pét. Ac. Sc. Bll. (1843) 129–.
Matteucci, C. A. C. 15 (1845) 498–.
Marié-Davy, —. (VI *Adds.*) Majocchi A. Fis. C. 26 (1847) 227–.
Delarive, A. Moigno Cosmos 8 (1856) 417–.
Hearder, J. N. Ph. Mg. 19 (1860) 14–.
Laming, R. Elect. 3 (1863) 143–, 167–, 180–.
Waterston, J. J. Ph. Mg. 31 (1866) 83–.
Hall, W. C. N. 17 (1868) 143–.
Herwig, H. A. Ps. C. 153 (1874) 411–.
Bucknill, (Capt.) J. T. Tel. E. J. 7 (1878) 327–.
Du Moncel, T. A. L. Lum. Elect. 1 (*1879) 61–.
(Cyclic variation.) *Schumann, O.* A. Ps. C. 38 (1889) 256–.
(Variations.) *Fessenden, R. A.* Science 21 (1893) 150.
Alcohol. *Foussereau, G.* C. R. 101 (1885) 243–; Par. S. Ps. Sé. (1885) 175–.
—, absolute. *Pfeiffer, E.* [1885] Münch. Ak. Sb. 15 (1886) 227–.
— ether mixtures. *Pfeiffer, W. R.* A. Ps. C. 26 (1885) 226–.

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Matthiessen, Aug. [1859–60] Phil. Trans. (1860) 161–; Pogg. A. 110 (1860) 190–.
Elsässer, E. A. Ps. C. 8 (1879) 455–.
Aubel, E. van. Par. S. Ps. Sé. (1894) 197–.
Rayleigh, (Lord). Nt. 54 (1896) 154–.
McMillan, W., & Housman, R. H. Nt. 54 (1896) 171–.
Liebenow, C. Elekttech. Z. 19 (1898) 28–, 62.
amalgam of bismuth and lead. *Englisch, E.* A. Ps. C. 45 (1892) 591–.
amalgams. *Battelli, A.* Rm. R. Ac. Linc. Mm. 4 (1887) 206–.
—. *Weber, C. L.* A. Ps. C. 31 (1887) 243–.
— of bismuth. *Vicentini, G., & Cattaneo, C.* Rm. R. Ac. Linc. Rd. 7 (1891) (*Sem.* 2) 95–.
—, liquid, mixed. *Gerosa, G. G.* Rm. R. Ac. Linc. Rd. 2 (1886) (*Sem.* 2) 344–; Rm. R. Ac. Linc. Mm. 4 (1887) 118–.
— of potassium and sodium. *Grimaldi, G. P.* Rm. R. Ac. Linc. Mm. 4 (1887) 46–, 624.
—, resistance and thermoelectromotive force, and molecular change. *Weber, C. L.* A. Ps. C. 23 (1884) 447–.
— of tin. *Vicentini, G.* Rm. R. Ac. Linc. Rd. 7 (1891) (*Sem.* 1) 258–.
copper with antimony. *Kamensky, G.* L. Ps. S. P. 6 (1885) 53–; Ph. Mg. 17 (1884) 270–.
— — magnesium. *Lagarde, —.* A. Tél. 16 (1889) 124–.
— — nickel. *Feussner, K.* Berl. Ps. Gs. Vh. (1891) 109–.
— — tin. *Lodge, O. J.* Ph. Mg. 8 (1879) 554–; L. Ps. S. P. 3 (1880) 158–.
ferromanganese with copper. *Nichols, E. L.* Am. J. Sc. 39 (1890) 471–.
fused. *Rösing, B.* [1886] S. C. In. J. 6 (1887)48.
fusible. *Weber, C. L.* A. Ps. C. 27 (1886) 145–.
—, in liquid state. *Cattaneo, C.* Tor. Ac. Sc. At. 27 (1892) 691–.
German silver in different dielectrics, Sanford's phenomenon. *Drago, E.* Catania Ac. Gioen. At. 12 (1899) *Mem.* 16, 16 pp.
— — — — media. *Sala, M.* N. Cim. 35 (1894) 251–.
iron. *Barrett, W. F., Brown, W., & Hadfield, R. A.* [1899] Dubl. S. Sc. T. 7 (1902) 67–.
of lead and cadmium. *Vicentini, G., & Cattaneo, C.* Rm. R. Ac. Linc. Rd. 1 (1892) (*Sem.* 1) 343–.
manganese. *Lindeck, —.* D. Nf. Tbl. (1889) 726–.
— with copper. *Heusler, —.* Bonn Niedr. Gs. Sb. (1891) 50–.
nickel steel. *Guillaume, C. É.* C. R. 125 (1897) 235–, 342.
— —, reostene. *Harker, J. A., & Davidson, A.* B. A. Rp. (1896) 714.

nickel steel, reostene. *Aubel, E. van.* Par. S. Ps. Sé. (1897) 133–.
platinoid. *Bottomley, J. T.* R. S. P. 38 (1885) 340–.
platinum. *Barus, C.* Am. J. Sc. 36 (1888) 427–; U. S. Gl. Sv. Bll. *No.* 54 (1889) 126–.
for resistance coils. *Feussner, K., & Lindeck, S.* Tel. J. 28 (1891) 742–.
— — —. *Lindeck, S.* Elect. 30 (1893) 119–.
and solid sulphides. *Gladstone, J. H., & Hibbert, W.* B. A. Rp. (1888) 347–.
— thermoelectromotive force and Hall effect. *Beattie, J. C.* Edinb. R. S. P. 20 (1895) 481–.
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— — — and tin with lead. *Vicentini, G., & Cattaneo, C.* Rm. R. Ac. Linc. Rd. 1 (1892) (*Sem.* 1) 419–.
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— — ballistic galvanometer. *Womack, F.* [1894] L. Ps. S. P. 13 (1895) 323–; Ph. Mg. 39 (1895) 172–.
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—, damping. *Solomon, M.* L. Ps. S. P. 17 (1901) 181–; Ph. Mg. 49 (1900) 559–.
—, device for projecting deflections on screen. *Mayer, A. M.* Am. J. Sc. 5 (1873) 270–.
—, new method of magnetising and astaticising. *Wadsworth, F. L. O.* Ph. Mg. 38 (1894) 482–.
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—, conditions of maximum. *Du Moncel, T.* [*A. L.*] C. R. 76 (1873) 368–.
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—, — — — (Du Moncel). *Raynaud, J.* C. R. 76 (1873) 1303–.
—, — — — (Raynaud). *Du Moncel, T.* [*A. L.*] C. R. 76 (1873) 1403–.
— and graduation. *Grassi, G.* Mil. I. Lomb. Rd. 10 (1877) 816–.
—, new method of measuring. *Negreanu, D.* Bucarest Ac. Rom. A. 22 (*Pt. admin.*) (1900) 523–.
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—, best resistance for. *Laws, F. A.* Ps. Rv. 5 (1897) 300–.
—, construction. *Schuster, A.* Elect. 33 (1894) 484–.
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—, protection from external magnetic influences. *Raps, A., & Franke, A.* Elekttech. Z. 17 (1896) 591.
—, of small resistance. *Homén, T.* Helsingf. Ófv. 40 (1898) 27–; Fschr. Ps. (1898) (*Ab.* 2) 536.
—, with variable damping. *Feussner, K.* Berl. Ps. Gs. Vh. (1891) 19–.
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—, maximum. *Edelmann, M. T.* Carl Rpm. 16 (1880) 670–.
—, —, angle. *Kempe, H. R.* Tel. J. 5 (1877) 145–.
—, —, conditions. *Du Moncel, (comte) T. A. L.* [1876–78] J. Tél. 3 (1877) 300–; (XII) Caen Ac. Mm. (1878) 3–.
—, especially of tangent galvanometers. *Schäfer, J. H.* (VIII) Arnhem Ntk. 6 (1850) 3–.
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—, at International Exhibition. *Guerout, A.* Lum. Élect. 7 (*1882) 82–.
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— — —, of Siemens and Halske. *Meyer, W.* Berl. Tel. Vr. Z. 7 (1860) 107–.
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—, theory. *Pierre, V.* Wien SB. 13 (1854) 527–.
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—, best conditions for. *Du Moncel, (comte) T. A. L.* C. R. 85 (1877) 377–, 481–.
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—, very sensitive. *Buff, H.* Lieb. A. 90 (1854) 1–.
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—, use of telephone as. *Arsonval, A. d'.* C. R. 86 (1878) 832–.
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—, reversed current-. *Dick, E.* Elekttech. Z. 15 (1894) 620.
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— —, modification. *Edelmann, M. T.* Elekttech. Z. 12 (1891) 37.
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—, Crompton. *Fisher, W. C.* Elect. 36 (1896) 158–, 192–, 370–, 440–, 647–; 37 (1896) 5–, 269–; 38 (1897) 154–.
—, direct-reading. *Anon.* Elect. Rv. 40 (1897) 806–.
— for measuring E.M.F. *Mauri, A.* Mil. I. Lomb. Rd. 30 (1897) 439–.
— — — polarisations. *Haber, F.* [1900] Z. Elektch. (1900–01) 13–.
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— — — polyphase systems. *Bowie, A. J. (jun.)* [1899] Sc. Abs. 3 (1900) 121.

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Electrepeter. *Clarke, E. M.* [1836] Sturgeon A. Electr. 1 (1836–37) 65–.
— and electrotome, magnetic. *Page, C. G.* Silliman J. 35 (1839) 112–.
Electromagnetic apparatus. *Jacobi, M. H.* Pogg. A. 54 (1841) 335–.
Fuses for explosives. *Ris, P.* C. R. 82 (1876) 977–.
— — —. *Scola, —, & Ruggieri, —.* Par. S. Ps. Sé. (1886) 188–.
— — —, apparatus for testing. *Ducretet, E.* C. R. 102 (1886) 1158–.
— — —, sensitiveness. *Sebert, —.* Par. S. Ps. Sé. (1885) 143–.
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Governor, Bain's. *Walker, C. V.* [1843] Walker Electr. Mg. 1 (1845) 112–.
Pachytrope. *Waszmuth, A.* A. Ps. C. 133 (1868) 677–.
—, universal. *Daurer, F.* Exner Rpm. 21 (1885) 281–.
Potential, apparatus for variation within wide limits. *Moehlenbrück, H.* [1895] Laus. S. Vd. Bll. 32 (1896) v.

REGULATORS.

Starr, J. W. Walker Electr. Mg. 2 (1846) 301–.
Hipp, M. [1862] Neuch. Bll. 6 (1861–63) 115–.
Mascart, É. [1873] Par. Sé. S. Ps. 1 (1873–74) 59–.
Hospitalier, É. Lum. Élect. 1 (*1879) 36–.
Richard, G. Lum. Élect. 18 (1885) 337–.
for alternating currents. *Allard, E.* (*et alii*). C. R. 95 (1882) 806–.
automatic. *Kohlrausch, F. W. G.* (XII) Frkf. a. M. Ps. Vr. Jbr. (1864–65) 75–; (1865–66) 32–; (VIII) A. Ps. C. 132 (1867) 266–.
—. *Hospitalier, É.* C. R. 87 (1878) 920–.
—. *Boettcher, E.* Tel. E. J. 13 (1884) 481–.
—. *Miron, F.* Lum. Élect. 42 (1891) 410–.
—, for lighting stations. *Menges, C. L. R. E.* Elekttech. Z. 8 (1887) 171–.
—, new principle. *Külp, L.* Carl Rpm. 18 (1882) 229–.
—, Thury. *Meylan, E.* Lum. Élect. 31 (1889) 274–.
for batteries. *Dupont, M.* Par. S. Phlm. Bll. 3 (1879) 200–.
— continuous currents. *Allard, E.* (*et alii*). C. R. 95 (1882) 747–.
— electric light. *Fernet, É.* C. R. 66 (1868) 609–.
— — —. *Carré, F.* C. R. 66 (1868) 612–.
— — —. *Lacoine, É.* Lum. Élect. 15 (1885) 356–.
— feeble currents. *Gore, G.* Birm. Ph. S. P. 4 (1883–85) 422–.
— galvanic coils. *Gore, G.* Ph. Mg. 6 (1853) 309–.
multiplier and regulator combined. *Gallois, F. L. von.* Pogg. A. 106 (1859) 136–.
Solignac's. *Guerout, A.* Lum. Élect. 5 (*1881) 190–.
voltage-, for 3-phase circuits. *Zweifel, G.* Sc. Abs. 3 (1900) 823.
—, Thury. *Leconte, F.* Brux. S. Sc. A. 18 (1894) (*Pt.* 1) 103.

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Arlincourt, L. d'. Par. Éc. Norm. A. 2 (1873) 121–.
Edison, T. A. Tel. J. 2 (1874) 319–.
Tommasi, D. Par. S. Ps. Sé. (1877) 86–.
Willot, —. A. Tél. 18 (1891) 63–.
Cerebotani, L. Rm. N. Linc. At. 53 (1900) 190–.
best resistance for. *Ayrton, W. E.* Tel. E. J. 4 (1875) 83–.
Claude's. *Pomey, J. B.* A. Tél. 18 (1891) 54–.
differential, Barker's. *Gramaccini, —.* A. Tél. 20 (1893) 101–.
electrocapillary. *Debrun, E.* J. de Ps. 2 (1883) 169–.
microphone. *Houston, E. J., & Thomson, E.* Franklin I. J. 76 (1878) 60–.
polarised, method of working. *Edison, T. A.* Tel. J. 2 (1874) 361.
telephonic. *Rood, O. N.* Am. J. Sc. 16 (1878) 59–.
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Repeater, electromagnetic. *Callan, N. J.* Sturgeon A. Electr. 1 (1836–37) 229–.
Resistance with spiral coils. *Joel, H. F.* Tel. J. 12 (1883) 388–.
Resistances, liquid. *Dary, G.* Sc. Abs. 1 (1898) 672–.
Rheometer, compressed-air-bell. *Scardona, E.* (XII) Rv. Sc.-Ind. 13 (1881) 354–.
Rheostat, oscillating, for producing current waves. *Leduc, S.* Sc. Abs. 3 (1900) 881.
Rheotome, aluminium. *Caël, E.* A. Tél. 5 (1878) 64–.
—, liquid, of constant direction, founded on new property of aluminium. *Ducretet, E.* Par. S. Ps. Sé. (1875) 17–.
Safety fuse metals, inherent defects. *Harrington, W. E.* Franklin I. J. 141 (1896) 464–.
— — wires for air-lines. *Mattausch, J.* Sc. Abs. 2 (1899) 866.
— fuses. *Feldmann, C. P.* Elect. 29 (1892) 87–.
— —, accurate and reliable. *Downes, L. W.* [1897] Sc. Abs. 1 (1898) 96.
— —, behaviour of various metals used for. *Cockburn, A. C.* [1887–88] Tel. E. J. 16 (1888) 650–; 17 (1889) 34–.
— — and circuit breakers. *Stine, W. M.* [1897] Sc. Abs. 1 (1898) 95.
— — — — —. *Henshaw, F. V.* [1897] Sc. Abs. 1 (1898) 95.
— — — — —. *Cutler, H. H.* Sc. Abs. 1 (1898) 450.
— —, enclosed. *Cartwright, D. J.* Sc. Abs. 1 (1898) 223–.
— —, —. *Sachs, J.* Sc. Abs. 3 (1900) 588.
— —, lead-wire, laws. *Feldmann, C.* Elekttech. Z. 13 (1892) 423–.
Separator and shunt for alternating currents of high tension. *Spottiswoode, W.* Ph. Mg. 13 (1882) 353–.
— for weak alternating currents. *Pettinelli, P.* Rv. Sc.-Ind. 31 (1899) 1–.
Switch, automatic, for accumulators. *Ebert, H.* A. Ps. C. 47 (1892) 349.
—, —, — —, Kent's. *Nevile, R. H. C.* Elect. 18 (1887) 523.
—, —, — charging accumulators. *Hospitalier, É.* Par. S. Ps. Sé. (1881) 190–.
—, — pneumatic, for charging accumulators. *Petersen, E.* Elekttech. Z. 20 (1899) 317–.

Switch, combined regulating, starting, and safety, for motors. *Wilson, A.* [1899] Sc. S. Arts T. 15 (1903) 52–.
—, dividing, for joint telephone and telegraph systems. *Zetzsche, E.* Elekttech. Z. 5 (1884) 211–.
—, —, — open and closed circuits. *Sack, J.* Elekttech. Z. 8 (1887) 371–.
—, mercury. *Janet, P.* Sc. Abs. 1 (1898) 440–.
—, safety, for accumulators. *Trumpy, J.* Elekttech. Z. 14 (1893) 177–.
—, —, — electric circuits. *Rowand, L. G.* Franklin I. J. 143 (1897) 357–.
Switchboard for accumulators in laboratories. *Wilke, A.* [1894] Z. Elekttech. Elektch. (1894–95) 317–.
—, telephone-, origin and development. *Kingsbury, J. E.* [1895] I. Elect. E. J. 24 (1896) 36–.
Tuning forks, use for distributing electric currents. *Mercadier, E.* A. Tél. 5 (1878) 290–.
— —, — — time measurement, interrupters, etc. *Schuller, A.* Mth. Termt. Éts. 12 (1894) 263–; Mth. Nt. B. Ung. 12 (1895) 133.
Valve. *Gaugain, J. M.* C. R. 40 (1855) 640–.
— (Gaugain). *Riess, P.* Berl. B. (1855) 393–.
— (Riess). *Gaugain, J. M.* C. R. 42 (1856) 17–.

6025 Frictional Electrostatic Machines.

Pearson, [*Rev.*] *W.* Nicholson J. 1 (1797) 506–.
Grimm, J. K. P. Gilbert A. 4 (1800) 359–.
Wolfram, —. Gilbert A. 74 (1823) 53–.
Belli, G. A. Sc. Lomb. Ven. 1 (1831) 111–.
Nott, J. B. A. Rp. (1843) (*pt.* 2) 15–.
Roberts, M. J. [1844] Walker Electr. Mg. 1 (1845) 358–.
Gherardi, S. Nap. Rd. 8 (1849) 73–.
Palmieri, L. Majocchi A. Fis. C. 1 (1850) 153–.
Giordano, C. Mil. I. Lomb. Rd. 2 (1869) 911–.
Cantoni, G. Mil. I. Lomb. Rd. 2 (1869) 917–, 973–.
(Machines of the 18th century.) *Pellissier, G.* Lum. Élect. 22 (1886) 68–, 106–.
Amalgam. *Böttger, R.* J. Pr. C. 107 (1869) 47.
— and mosaic gold, coating for electric rubbers. *Fischer, W. R.* [1836] (VI *Adds.*) Maryland Ac. T. 1 (1837) 156–.
Ancient and modern machines. *Pellat, H.* Rv. Sc. 37 (1886) 353–.
Circulation of electricity. *Gaugain, J. M.* C. R. 48 (1859) 744–.
Collector. *Emsmann, H.* A. Ps. C. 145 (1872) 332–.
—, simple condensing. *Roberts, S.* Ph. Mg. 47 (1874) 49–.
Cylinder machine, double exciting. *Eaton, R.* Sturgeon A. Electr. 7 (1841) 81–.
— — with 2 rubbers. *Goodman, J.* Sturgeon A. Electr. 7 (1841) 212–.
— machines. *Gregorio, A. de.* Palermo Ac. At. 3 (1895) (*Sc. Nt.*) 61 (*bis*)–.
Earth connection unnecessary. *Hare, R.* Franklin I. J. 11 (1833) 296–.
Efficiency. *Cantoni, G.* Mil. I. Lomb. Rd. 2 (1869) 1205–.
Experiments (effects of friction between bodies). *De-Luc, J. A.* (VI *Adds.*) Nicholson J. 28 (1811) 1–; 33 (1812) 196–.
—. *Pfister, F.* Baumgartner Z. 3 (1827) 439–.
— with machine with connected conductors. *Gazzaniga, C. L.* A. Sc. Lomb. Ven. 3 (1833) 311–; 6 (1836) 79–.
Friction, losses due to. *Dettmar, G.* Elekttech. Z. 20 (1899) 380–, 397–.
Frictional electricity, arrangement for continuous development. *Reinsch, H.* D. Nf. Vsm. B. (1845) 118–.
— —, discharger for. *Plettner, F.* Pogg. A. 117 (1862) 485–.
— —, transmission of energy by. *Beaulieu-Marconnay, — von.* Humb. 3 (1884) 343.
— and induction machine. *Carré, F.* C. R. 67 (1868) 1341.
Generation of electricity. *Rains, G. W.* Silliman J. 49 (1845) 93–.
Hydro-electric machine. *Armstrong, W. G.* Ph. Mg. 17 (1840) 452–; 18 (1841) 50–; 19 (1841) 25–; 20 (1842) 5–; 23 (1843) 194–; Arch. de l'Électr. 1 (1841) 145–, 478–; A. C. 7 (1843) 401–; B. A. Rp. (1845) (*pt.* 2) 30–.
— —, Armstrong's. *Walker, C. V.* [1843] Walker Electr. Mg. (1845) 122–.
— —, —, existence of both kinds of electricity in same jet of steam. *Zantedeschi, F.* Ven. At. 4 (1845) 117–.
— —, —, phenomena. *Zantedeschi, F.* [1846] Ven. Mm. I. 4 (1852) 45–.
— —, steam boiler for. *Matteucci, C.* Pisa Misc. Md. Chir. (1843) (*pte.* 2) 26–.
Improvements. *Wolff*, —. Gilbert A. 12 (1803) 597–.
—. *Singer, G. J.* Nicholson J. 12 (1805) 103–.
—. *Cuthbertson, J.* Nicholson J. 26 (1810) 9–.
—. *Gazzaniga, C. L.* A. Sc. Lomb. Ven. 2 (1832) 359–.
—. *Crahay, J. G.* Arch. de l'Électr. 4 (1844) 162–.
—. *Vincenot*, —. Metz Mm. Ac. 30 (1848–49) 402–.
Insulation. *Cantoni, G.* Mil. I. Lomb. Rd. 4 (1867) 126–.
Method of working in all kinds of weather. *Münch*, —. C. R. 30 (1850) 47–.
Modification. *Kundt, A.* A. Ps. C. 135 (1868) 484–.
—, Gherardi's. *Palmieri, L.* Nap. Rd. 2 (1843) 96–.
Nairne's machine, modification. *Pérard, L.* Brux. Ac. Bll. 28 (1869) 567–.

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(Van Marum's machine.) *Nicholson, W.* Nicholson J. 1 (1797) 83–.
(— — —, experiments.) *Ritter, J. W.* Voigt Mg. 9 (1805) 158–.
Hare, R. Am. Ph. S. T. 5 (1837) 365–.
(Van Marum's machine, modification.) *Crahay, J. G.* Brux. Ac. Bll. 10 (1843) (*pte.* 2) 287–.
Dujardin, —. (VI *Adds.*) Majocchi A. Fis. C. 12 (1843) 186–.
comparison with cylinder machines. *Nicholson, W.* Nicholson J. 1 (1797) 83–.
— — — —. *Cuthbertson, J., & Singer, G. J.* Nicholson J. 26 (1810) 218–.
— — — —. *Hearder, J. N.* (X) Plym. I. T. (1857–58) 10–.
with glass plate. *Tarelli, R.* N. Cim. 8 (1858) 360–.
— 2 glass plates. *Reitlinger, E.* Wien SB. 38 (1859) 360–.
— horizontal plate. *Hare, R.* Tilloch Ph. Mg. 62 (1823) 8–.
improvement. *Metzger, —.* Bb. Un. 24 (1823) 187–.
phenomena. *Ducis, —.* (VI *Adds.*) C. R. 34 (1852) 208–.
powerful, new and economical method of constructing. *Magrini, L.* Mil. Mm. I. Lomb. 7 (1859) 249–.
producing positive and negative electricity. *Zantedeschi, F.* [1843] Ven. Mm. I. 2 (1845) 171–.
with sulphur plate. *Richer, —.* Ph. Mg. 29 (1865) 551.

Pocket ribband-machine for charging small Leyden jar. *Till, J.* Nicholson J. 3 (1800) 4–.
Power of machines (Cuthbertson's experiments). *Nicholson, W.* Nicholson J. 2 (1799) 215–.
—, means of increasing. *Grotthus, T. von.* Schweigger J. 29 (1820) 74–.
Ramsden's machine, improvements. *Monti, M. M.* (XII) Rv. Sc.-Ind. 7 (1875) 4–.
Resistance, variation with velocity. *Lacoine, É.* C. R. 93 (1881) 958–.
Silk band machines (Rouland's and Walckier's). *Nicholson, W.* Nicholson J. 2 (1799) 420–.
Transformation. *Holtz, W.* Gött. Nr. (1876) 494–.
Water-cushion. *Walker, C. V.* [1838] Sturgeon A. Electr. 3 (1838–39) 62–.

6027 Induction Electrostatic Machines.

(Production of intense currents.) *Töpler, A.* A. Ps. C. 125 (1865) 469–.
Cantoni, G. Mil. I. Lomb. Rd. 4 (1867) 328–.
Bertin, A. A. C. 15 (1868) 169–.
Carl, P. Carl Rpm. 4 (1868) 106–, 141–, 422–.
(Two old machines in a new form.) *Poggendorff, J. C.* A. Ps. C. 136 (1869) 171–.
Provenzali, F. S. Rm. At. N. Linc. 24 (1871) 271–; 25 (1872) 371–.
Poggendorff, J. C. Berl. Ak. Mb. (1874) 51–.
Geneix-Martin, (l'abbé) —. As. Fr. C. R. 6 (1877) 342–.
Gaiffe, A. C. R. 86 (1878) 1263.
Töpler, A. J. I. (XII) Elekttech. Z. 1 (1880) 56–.
Valette, H. Les Mondes 56 (1881) 395–, 513–; 1 (1881) 57–.
Töpler, A. J. I. (XII) Elekttech. Z. 3 (1882) 366–.
Fuchs, F. Z. Instk. 4 (1884) 225–, 296; 5 (1885) 163.
Schiøtz, O. E. N. Mg. Ntvd. 28 (1884) 67–.
Hempel, W. A. Ps. C. 25 (1885) 487–.
(Simple form.) *Elster, J., & Geitel, H.* A. Ps. C. 25 (1885) 493–.
Hillairet, —. J. de Ps. 5 (1886) 208–.
Lewandowski, R. Cztg. Opt. 9 (1888) 184–, 196–.
Bergmann, J. N.-Vorp. Mt. 21 (1890) 35–.
Taylor, J. E. Elect. Rv. 31 (1892) 427–, 457–, 499–.
Pidgeon, W. R. L. Ps. S. P. 12 (1894) 406–; Ph. Mg. 36 (1893) 267–.
Anders, T. Riga Cor.-Bl. 37 (1894) 85–.
Bonetti, —. Par. S. Ps. Sé. (1894) 96.
Gellio, G. Rv. Sc.-Ind. 27 (1895) 233–.
Mooser, J. St. Gal. B. (1894–95) 91–.
Negreanu, D. Bucarest Ac. Rom. A. 19 (*Pt. admin.*) (1897) 380–; Bucarest S. Sc. Bl. 6 (1897) 509–.
Lykke, P. S. N. Ts. Fs. K. 3 (1898) 29–; Fschr. Ps. (1898) (*Ab.* 2) 435.
Pidgeon, W. R. L. Ps. S. P. 16 (1899) 253–; Ph. Mg. 46 (1898) 564–.
Action, decrease. *Forster, (Prof.) A.* Bern Mt. (1871) xvii–.
— with and without metallic inductors. *Töpler, A.* A. Ps. C. 127 (1866) 177–.
—, variability. *Carl, P.* Carl Rpm. 5 (1869) 279–, 375–.
Alternators, electrostatic. *Muras, T. H.* Elect. Rv. 30 (1892) 764–; 31 (1892) 593–.
—, —. *Schaffers, V.* Brux. Ac. Bll. 34 (1897) 885–.
Ancient and modern machines. *Pellat, H.* Rv. Sc. 37 (1886) 353–.
Comparison with dynamos. *Thompson, S. P.* L. Ps. S. P. 9 (1888) 260–.
Conductors, diametral, new properties. *Poggendorff, J. C.* Berl. Mb. (1870) 275–.
Construction. *Doubrava, S.* Tel. J. 13 (1883) 77–.
Currents. *Rossetti, F.* N. Cim. 12 (1874) 89–, 177–.
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— —. *Cecchi, (padre) F.* (XII) Rv. Sc.-Ind. 4 (1872) 180–, 212–.
— —, Carré's, improvements. *Adamson, D. B.* (XII) S. Aust. R. S. T. 6 (1883) 27–.
Double machine. *Carl, P.* Carl Rpm. 6 (1870) 129–.
— —. *Poggendorff, J. C.* Berl. Mb. (1870) 275–.

Double machine, Poggendorff's, reversal of current. *Rossetti, F.* N. Cim. 11 (1874) 5–.
— —, theory. *Poggendorff, J. C.* Berl. Mb. (1871) 534–.
Doubler. *Nicholson, W.* Nicholson J. 1 (1797) 16–.
—. *Read, J.* A. C. 24 (1797) 327–.
—, Belli's. *Volpicelli, P.* [1874–76] Rm. R. Ac. Linc. At. 1 (1875) xxviii–; 3 (1876) (*Pt.* 2) 617–.
—, —, and Kelvin's replenisher. *Murani, O.* Mil. I. Lomb. Rd. 28 (1895) 313–.
—, Bennet's. *Désormes, C. B., & Hachette, —.* A. C. 49 (1804) 45–.
—, — and Nicholson's, and Cavallo's multiplier. *Bohnenberger, G. C.* Gilbert A. 9 (1801) 158–.
—, improved. *Munck af Rosenschöld, P. S.* Stockh. Öfv. 3 (1846) 298–.
—, Nicholson's, theory. *Volpicelli, P.* C. R. 75 (1872) 257–.
—, pendulum-. *Ronalds, (Sir) F.* Edinb. Ph. J. 9 (1823) 322–.
—, revolving. *Nicholson, W.* Nicholson J. 4 (1801) 95–.
—, sensitive. *Elster, J., & Geitel, H.* A. Ps. C. 25 (1885) 114–.
Ebonite disc machine, experiments. *Bleekrode, L.* A. Ps. C. 156 (1875) 278–; Amst. Ak. Vs. M. 9 (1876) 312–.
—, supposed superiority. *Holtz, W.* A. Ps. C. 157 (1876) 486–.
—, — — (Holtz). *Schlösser, J. [S.?] C.* A. Ps. C. 158 (1876) 656–.
—, — — (Schlösser). *Holtz, W.* A. Ps. C. 159 (1876) 473–.
Electro-motor, static. *Zipernowski, C.* [1889] I. Elect. E. J. 18 (1890) 701–.

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Winter, K. Haidinger B. 2 (1846–47) 449–.
Pazienti, A. Ven. At. 9 (1864) 1047–.
Bezold, W. von. Münch. Sb. (1870) (2) 134–; A. Ps. C. 143 (1871) 52–.
Fuller, G. L. Ps. S. P. 2 (1879) 83–; Ph. Mg. 2 (1876) 108–.
charge on disc. *Douliot, É.* C. R. 82 (1876) 1262–.
comparison with other machines. *Riess, P. T.* Berl. Mb. (1869) 861–.
complete cycle with. *Garnett, W.* Mess. Mth. 4 (1875) 28–.
continuous. *Bertsch, —.* C. R. 63 (1866) 771–.
— (Bertsch). *Parville, H. de.* C. R. 63 (1866) 881–.
— (Parville). *Bertsch, —.* C. R. 63 (*1866) 910–.
— (priority question). *Piche, A.* C. R. 64 (1867) 260–.
—. *Volpicelli, P.* Rm. At. N. Linc. 21 (1868) 239–; C. R. 67 (1868) 843–.
—, multiplying. *Parville, H. de.* C. R. 64 (1867) 40–.
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ebonite, double excitation. *Schlösser, J. [S.?] C.* A. Ps. C. 160 (1877) 335–.
and electric fish. *Nicholson, W.* Nicholson J. 1 (1797) 355–.
— electrostatic induction. *Cantoni, G.* Mil. I. Lomb. Rd. 2 (1869) 26–, 109–.
— — — (Cantoni). *Éccher, A. de.* (IX) N. Cim. 7 & 8 (1872) 205–.
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—. *Stroumbo, S.* Les Mondes 38 (1875) 31–.
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phenomena, and Franklin's theory. *Woods, S.* [1803] Tilloch Ph. Mg. 21 (1805) 289–.
plate of, and powders, experiments. *Eynard, J.* Bb. Un. 22 (1823) 18–.
reciprocal, Varley's. *Thomson, (Sir) W.* Ph. Mg. 35 (1868) 287–.
rotatory. *Demoget, A.* Les Mondes 19 (1869) 358–.
—. *Piche, A.* As. Fr. C. R. (1892) (*Pt.* 2) 254–.
theory. *Buff, H.* Lieb. A. 41 (1842) 129–.
— (Buff). *Zamboni, G.* [1844] Ven. Mm. I. 2 (1845) 251–.
—. *Petrina, F. A.* Böhm. Gs. Ab. 4 (1845–46) 525–.
—. *Bezold, W. von.* Münch. Sb. (1871) 18–.
—. *Cantoni, G.* Rm. R. Ac. Linc. At. 3 (1876) (*Pte.* 2) 233–.
—. *Govi, G.* Rm. R. Ac. Linc. Mm. 9 (1881) 72–.
—. *Villari, E.* N. Cim. 10 (1881) 69–; 11 (1882) 50–.
—. *Rimington, E. C.* Tel. J. 22 (1888) 9–.
— and description. *Hermite, (capit.) —.* C. R. 39 (1854) 1200–.
— — phenomena. *Hummel, C.* Baumgartner Z. 2 (1833) 213–.
Volta's, modification. *Phillips, J.* Ph. Mg. 2 (1833) 363–.
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Electrophorus machine. *Pierucci, F.* (XII) Rv. Sc.-Ind. 10 (1878) 259–.
— — for charging batteries. *Riess, P. T.* A. Ps. C. 140 (1870) 168–.
— —, construction and action. *Töpler, A.* A. Ps. C. 130 (1867) 518–.
— machines. *Riess, P. T.* A. Ps. C. 145 (1872) 333–.
— —, theory of newest. *Riess, P. T.* Berl. Mb. (1870) 1–.
— —, use. *Riess, P. T.* Berl. Ak. Mb. (1874) 196–.
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— physical properties. *Hurmuzescu, —.* [1900] Sc. Abs. 4 (1901) 401–.
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Metal arborisations, influence of galvanic electricity. *Grotthus, T. von.* A. C. 63 (1807) 5–.
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—. *Levison, W. G.* Am. J. Sc. 19 (1880) 29–.
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Pressure, electrolysis under. *Bouvet, A.* C. R. 87 (1878) 1068–.
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—, influence. *Ronzoni, C.* (XI) N. Cim. 2 (1869) 235–.
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Sewage purification. *Webster, W.* Elect. 21 (1888) 558–.
Sounds produced by electrolysis. *Gore, G.* [1861] R. S. P. 11 (1860–62) 177–, 491–; 12 (1862–63) 217–.
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Thermoelectric and hydroelectric sources, and quantity of electricity necessary to decompose 1 gramme of water. *Pouillet, C. S. M.* C. R. 4 (1837) 785–.
"Transfer resistance" in electrolytic cells. *Gore, G.* [1886] Birm. Ph. S. P. 5 (1885–87) 26–.
— — - - — and voltaic cells. *Gore, G.* R. S. P. 38 (1885) 209–.
— —, relation to molecular weight and chemical composition of electrolytes. *Gore, G.* Birm. Ph. S. P. 5 (1885–87) 426–.
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Amalgams. *Lindeck, S.* A. Ps. C. 35 (1888) 311–.
Cadmium amalgam. *Jaeger, W.* A. Ps. C. 65 (1898) 106–.
Carbon. *Palagi, A.* Bologna Rd. (1855–56) 62–.
— at high temperatures. *Brooks, E. E.* Elect. Rv. 35 (1894) 190–, 223–.
— — — —. *Freund, M.* Frkf. a. M. Ps. Vr. Jbr. (1898–99) 40–.
— and platinum. *Fromme, —.* D. Nf. Tbl. (*1879) 178–.
Chromium. *Hittorf, W.* Berl. Ak. Sb. (1898) 193–; Z. Elektch. (1899–1900) 6–; Z. Ps. C. 30 (1899) 481–.
Hydrogen. *Buff, H.* Lieb. A. 41 (1842) 136–.
—. *Majocchi, G. A.* (VI *Adds.*) Majocchi A. Fis. C. 9 (1843) 282–.
—, electrical relationship to metals. *Henrici, F. C.* Pogg. A. 117 (1862) 175–.
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— — fluorine, relative electronegative powers. *Knox, T.* B. A. Rp. (1843) (*pt.* 2) 39.
Iron. *Martens, M.* Brux. Ac. Sc. Mm. 19 (1845) 46 pp.
— and platinum peroxides. *Schönbein, C. F.* Pogg. A. 43 (1838) 89–.
—, wrought and cast, and steel. *Andrews, T.* [1883] Edinb. R. S. T. 32 (*1887) 205–.

Mercury. *Marianini, S.* A. Sc. Lomb. Ven. 3 (1833) 217–.
Metals. *Tatum, J.* Tilloch Ph. Mg. 51 (1818) 438–.
—. *Avogadro, A.* [1822] Tor. Mm. Ac. 27 (1823) 43–.
—. *Bischof, G.* Schweigger J. 52 (=*Jb.* 22) (1828) 230–.
—. *Kohlrausch, R.* Pogg. A. 82 (1851) 1–.
—, chemical potential. *Bancroft, W. D.* Z. Ps. C. 12 (1893) 289–; Am. Ac. P. 31 (1896) 96–; Ps. Rv. 3 (1896) 250–.
—, electric relations in fused substances. *Gore, G.* Ph. Mg. 27 (1864) 446–.
—, electronegative. *Dingler, E. M.* Kastner Arch. Ntl. 18 (1829) 249–.
— and minerals. *Fox, R. W.* Phil. Trans. (1835) 39–.
—, principal, changes produced by voltaic currents in electric tension. *Marianini, S.* (VIII) Mm. Fis. Sperim. 1 (1837) 97–.
—, relative E. M. F. *Marianini, S.* (VIII) Mm. Fis. Sperim. 1 (1837) 77–.
Oxygen. *Viard, —.* A. C. 36 (1852) 129–; 42 (1854) 5–.
— and hydrogen. *Ritter, J. W.* Gilbert A. 9 (1801) 1–.
Polarity, electrochemical, of homogeneous metals. *Wetzlar, G.* Schweigger J. 58 (=*Jb.* 28) (1830) 302–.
—, —, — — — (Wetzlar). *Fechner, G. T.* Schweigger J. 59 (=*Jb.* 29) (1830) 113–.
—, electrolytic, laws. *Bartoli, A.* Rm. R. Ac. Linc. Mm. 8 (1880) 75–.
Potassium cyanide solution. *Poggendorff, J. C.* Pogg. A. 66 (1845) 597–.
— — —. *Skey, W.* N. Z. I. T. 8 (1876) 334–.
Voltaic combinations. *Jacobi, M. H.* [1846] St. Pét. Ac. Sc. Bll. 5 (1847) 209–.
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Zinc. *Wüllner, A.* Bonn SB. Niedr. Gs. (1869) 146–; D. Nf. Tbl. (*1869) 195–.
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Alloys, changes of voltaic energy during fusion. *Gore, G.* Ph. Mg. 32 (1891) 27–.
Amalgams. *Le Blanc, M.* Z. Ps. C. 5 (1890) 467–.
— of alkali metals, theory of formation. *Schoeller, A.* [1898] Z. Elektch. (1898–99) 259–.
Calorific values. *FitzGerald, D. G.* Elect. 18 (1887) 457, 498–.
Carbon. *Coehn, A.* Z. Elektch. (1896–97) 424–.
—. *Pease, H. C.* J. Ps. C. 4 (1900) 38–.
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Chemical equilibrium and E. M. F. *Bredig, G.* Frkf. a. M. Ps. Vr. Jbr. (1897–98) 62–.
— — — —. *Knüpffer, C.* Z. Ps. C. 26 (1898) 255–.
— — — — (Knüpffer). *Bredig, —.* Z. Elektch. (1897–98) 544–.

Chemical equilibrium and E.M.F. *Danneel, H.* [1899] Z. Elektch. (1899–1900) 293–.
— — — —. *Rothmund, V.* Z. Ps. C. 31 (1899) 69–.
Constancy. *Couette, M.* J. de Ps. 1 (1892) 350–.
Copper. *Beach, F. E.* Am. J. Sc. 46 (1893) 81–, 490.
—, apparent variability. *Vanni, J.* A. Ps. C. 44 (1891) 214–.
—, electrochemical deposition. *Dickson, J. C.* Glasg. Ph. S. P. 31 (1900) 52–.
Electrolysis applied to standardising electric current and potential meters. *Gray, T.* Ph. Mg. 22 (1886) 389–.
Electromotive formula. *Volpicelli, P.* Rm. At. 7 (1853–54) 227–, 275–.

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(Faraday.) *Sturgeon, W.* Sturgeon A. Electr. 1 (1836–37) 367–.
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(Becquerel.) *Matteucci, C.* A. C. 12 (1844) 122–.
(Matteucci.) *Becquerel, E.* [1844] A. C. 13 (1845) 216–.
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Delarive, A. Bb. Un. Arch. 26 (1854) 134–; 27 (1854) 177–.
Soret, J. L. Bb. Un. Arch. 29 (1855) 265–; C. R. 41 (1855) 220–.
Buff, H. Lieb. A. 105 (1858) 144–; 110 (1859) 257–.
Moutier, J. Lum. Élect. 19 (1886) 145–.
and conductivity of dilute solutions. *Bouty, E.* C. R. 98 (1884) 908–.
converse, experimental verification. *Renault, B.* A. C. 11 (1867) 137–.
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Cappa, C. Tor. Ac. Sc. At. 13 (1877) 867-.
Erhard, —. Jb. Berg- Hw. (1885) 175-.
Piltschikoff, N. C. R. 109 (1889) 105-.
Gouré de Villemontée, G. J. de Ps. 9 (1890) 65-, 593.
Pellat, H. A. C. 19 (1890) 556-.
(Pellat.) *Braun, F.* A. Ps. C. 41 (1890) 448-.
(Braun.) *Pellat, H.* A. Ps. C. 44 (1891) 550-.
(Pellat.) *Braun, F.* A. Ps. C. 45 (1892) 185-.
Rothmund, V. Z. Ps. C. 15 (1894) 1-.
Meyer, G. A. Ps. C. 56 (1895) 680-.
Wiedeburg, O. A. Ps. C. 59 (1896) 742-.
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— — pressure. *Wild, H.* Bern Mt. (1864) 200-.
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— — very brief contact with electrolytes. *Luggin, H.* Wien Ak. Sb. 102 (1893) (*Ab.* 2*a*) 913-.
— — cyanide of potassium solution. *Mactear, J.* [1895] I. Mn. Mtl. T. 4 (1895-96) 37-.
— — — solutions. *Thompson, S. P.* R. S. P. 42 (1887) 387-.
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— — — very rapid oscillations. *Klemenčič, I.* Wien Ak. Sb. 108 (1899) (*Ab.* 2*a*) 568–.
— — — rotation of disc in magnetic field. *Favre, P. A.* C. R. 73 (1871) 648–; 75 (1872) 693–.
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— metallic cover of magnet, currents induced in. *Moberg*, *A.* [1867] Helsingf. Acta 9 (1871) 111–.
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— — —. *Granqvist*, *G.* Lund. Un. Acta 32 (1896) (*S. Psgr.*, *No.* 1, 36 pp.).
— electric balance. *Maxwell*, *J. C.* [1864] Phil. Trans. 155 (1865) 475–.
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— — galvanism explained on mechanical theory of matter and motion. *Phillips, (Sir) R.* L. Md. Ps. J. 44 (1820) 393–.
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Spectral lines, double, cause. *Stoney, G. J.* [1891] Dubl. S. Sc. T. 4 (1888–92) 563–.
— —, motions competent to produce groups. *Stoney, G. J.* B. A. Rp. (1895) 610–.
Spectrum, solar, radiation, waves and ether. *Broca, A.* Rv. Sc. 6 (1896) 1–.
Wave surface, electromagnetic. *Heaviside, O.* Ph. Mg. 19 (1885) 397–.
— —, optical, transformation by homogeneous strain. *Heaviside, O.* R. S. P. 55 (1894) 30–.
— train, passage through conducting dielectric. *Yule, G. U.* L. Ps. S. P. 13 (1895) 358–; Ph. Mg. 39 (1895) 309–.
— —, — — layers of electrolyte. *Yule, G. U.* Ph. Mg. 36 (1893) 531–.
Waves, anomalous propagation, experiment. *Zeeman, P.* [1897] Amst. Ak. Vs. 6 (1898) 11–; Fschr. Ps. (1897) (*Ab.* 2) 70–.

Waves, electric, in dielectric media, most general type. *Larmor, J.* [1891] Camb. Ph. S. P. 7 (1892) 164–.
—, electromagnetic, absorption. *Righi, A.* Rm. R. Ac. Linc. Rd. 6 (1897) (*Sem.* 1) 214–.
—, —, and forced vibrations of electromagnetic systems. *Heaviside, O.* Ph. Mg. 25 (1888) 130–, 202–, 379–; 26 (1888) 360–, 434–, 488–.
—, — —, luminous, ponderomotive forces. *Sadovskij, A. I.* Rs. Ps.-C. S. J. 29 (*Ps.*) (1897) 82–; J. de Ps. 6 (1897) 612.
—, —, opacity to. *Lodge, O.* L. Ps. S. P. 16 (1899) 351–; Ph. Mg. 47 (1899) 385–.
—, —, and propagation of potential. *Heaviside, O.* Elect. 22 (1889) 23–.
—, —, rectilinear, action on neighbouring conducting circuit. *Hertz, H.* A. Ps. C. 34 (1888) 155–.

6625 Transparent Media in the Electromagnetic Theory of Light.

Æolotropic media, light propagation. *Koláček, F.* Prag Sb. (1897) (*Mth.-Nt.*) *No.* 56, 107 pp.
— —, wave surface and rotation of polarisation plane. *McAulay, A.* Ph. Mg. 42 (1896) 224–.
Conductivity, electric, and optical properties, relations. *Provenzali, F. S.* Rm. N. Linc. Mm. 6 (1890) 7–.
Critical constant and molecular refraction, relation. *Guye, P. A.* Par. S. Ps. Sé. (1890) 17–.
Crystal optics, phenomena. *Ketteler, E.* A. Ps. C. 55 (1895) 525–.
Crystalline reflection. *Basso, G.* Tor. Ac. Sc. At. 20 (1885) 537–.
Crystals, absorption of light by. *Brunhes, B.* C. R. 120 (1895) 1041–; Éclair. Élect. 4 (1895) 193–, 352–, 529–, 596–.
—, effect of electromagnetic and light waves. *Ssadowsky, A. J.* Fschr. Mth. (1899) 794.
—, gypsum, direction of extinction of electric rays in. *Righi, A.* Rm. R. Ac. Linc. Rd. 5 (1896) (*Sem.* 1) 152–.
—, magnetic, propagation of light in. *Sella, A.* Rm. R. Ac. Linc. Rd. 4 (1895) (*Sem.* 2) 237–, 283–.
—, reflection on surface. *Curry, C. E.* B. A. Rp. (1898) 811–.
Dispersion. *Heaviside, O.* Elect. 37 (1896) 470–.
Double refraction and dispersion. *Gibbs, J. W.* Am. J. Sc. 23 (1882) 262–, 460–; 25 (1883) 107–.
— — — —, comparison of elastic and electromagnetic theories. *Gibbs, J. W.* Am. J. Sc. 35 (1888) 467–.
— — of electric rays. *Mack, —.* [1894] Würtb. Jh. 51 (1895) cx.
— — — — — in crystals. *Pasquini, E.* N. Cim. 7 (1898) 153–.
— —, theory. *Ketteler, E.* A. Ps. C. 49 (1893) 509–.

Double refraction, theory (Ketteler). *Voigt, W.* A. Ps. C. 50 (1893) 377–.
Doubly refracting crystals, polarisation of electric rays by. *Bose, J. C.* Beng. As. S. J. 64 (*Pt.* 2) (1896) 291–.
— — gelatine plates, electrical and magnetic properties. *Ambronn, H.* Leip. Mth. Ps. B. 43 (1891) 394–.
— — media, luminous vibrations in. *Volterra, V.* Acta Mth. 16 (1892–93) 153–.
Ebonite, expansion under action of light. *Hoorweg, J. L.* Arch. Néerl. 15 (1880) 503–.
Homogeneous isotropic medium, solution of Maxwell's equations for. *Heaviside, O.* Ph. Mg. 27 (1889) 29–.
— — —, — — — — —. *Birkeland, K.* Christiania F. (1895) (*Ov.*) 6–; C. R. 120 (1895) 1046–.
Ice, dispersion for electric waves, and specific inductive capacity. *Gutton, C.* C. R. 130 (1900) 1119–.
—, propagation of electromagnetic waves in, and dielectric power. *Blondlot, R.* C. R. 119 (1894) 595–.
Rotatory polarisation, natural. *Goldhammer, D.* J. de Ps. 1 (1892) 205–, 345–.
Selenite, ellipsoid of polarisation relative to electromagnetic waves in, and elliptic polarisation of waves. *Righi, A.* Rm. R. Ac. Linc. Rd. 6 (1897) (*Sem.* 1) 207–.
—, orientation of disc in uniform electric field. *Righi, A.* Bologna Rd. 1 (1897) 177–.
Solutions, colour of, dependence on nature of solvent. *Donnan, F. G.* Nt. 54 (1896) 55.

6627 Metallic Media in the Electromagnetic Theory of Light.

Goldhammer, D. A. Rs. Ps.-C. S. J. 24 (*Ps.*) (1892) 40–; J. de Ps. 1 (1892) 440.
Capacity of metals for absorption of electromagnetic energy. *Bjerknes, V.* Sk. Nf. F. (1892) 373–; A. Ps. C. 47 (1892) 69–.
Ionic theory of metals. *Drude, P.* Ps. Z. 1 (1900) 161–.
Newton's rings, analogous phenomenon produced by plane waves through plane parallel metal plates. *Boltzmann, L.* [1892] Münch. Ak. Sb. 22 (1893) 53–.
Penetration of electric waves into metals. *Bjerknes, V.* Stockh. Ak. Hndl. Bh. 19 (*Afd.* 1) (1894) *No.* 3, 16 pp.

6630 Aberration and Moving Media.

(*See also* 3420.)

Aberration, Stokes's theory. *Lorentz, H. A.* [1892] Amst. Ak. Vs. [1] (1893) 97–.
—, — —, on supposition of variable density of ether. *Lorentz, H. A.* Amst. Ak. Vs. 7 (1899) 523–; Amst. Ak. P. 1 (1899) 443–.
Drift, consequences of Fresnel's law. *Potier, A.* J. de Ps. 3 (1874) 201–.
— due to motion of matter. *Potier, A.* J. de Ps. 5 (1876) 105–.
Motion of Earth, electromagnetic effect. *Fitz-Gerald, G. F.* [1882] Dubl. S. Sc. T. 1 (1883) 319–.
— — —, influence on diffraction. *Willigen, V. S. M. van der.* [1870] (xi) Haarl. Ms. Teyl. Arch. 3 (1874) 72–.
— — electrified bodies, electric and magnetic effects. *Thomson, J. J.* Ph. Mg. 11 (1881) 229–.
— — ether near Earth. *Lodge, O.* [1892–93] R. I. P. 13 (1893) 565–; Phil. Trans. (A) 184 (1894) 727–; Ph. Mg. 36 (1893) 549–.
— — —, and Earth's atmosphere. *FitzGerald, G. F.* Science 13 (1889) 390.
— — — in electromagnetic field. *Henderson, W. C., & Henry, J.* Ph. Mg. 44 (1897) 20–.
— — — on Maxwell's theory. *Helmholtz, H. von.* Berl. Ak. Sb. (1893) 649–.
— — —, new experiment. *Mie, G.* D. Nf. Vh. (1900) (*Th.* 2, *Hälfte* 1) 26–.
— — medium, deflection of electromagnetic wave by. *Heaviside, O.* Elect. 22 (1889) 663–.
— — refracting body and azimuth of polarisation of refracted ray. *Fizeau, H. L.* C. R. 49 (1859) 717–; A. C. 58 (1860) 129–.
— — translation of ether. *Wien, W.* D. Nf. Vh. (1898) (*Th.* 2, *Hälfte* 1) 49–.
— — — — —. *Lorentz, H. A.* D. Nf. Vh. (1898) (*Th.* 2, *Hälfte* 1) 56–.
Moving bodies, application of Maxwell's theory. *Lorentz, H. A.* Arch. Néerl. 25 (1892) 363–.
— conductors, electrodynamic forces in. *Helmholtz, H. L. F. von.* Crelle J. Mth. 78 (1874) 273–.
— —, — — — (Helmholtz). *Bertrand, J.* C. R. 79 (1874) 337–.
— liquids, double refraction of light in. *Kundt, A.* A. Ps. C. 13 (1881) 110–.
— media, propagation of light in. *Reiff, R.* A. Ps. C. 50 (1893) 361–.
— —, reflection of light from. *Lorentz, H. A.* [1892] Amst. Ak. Vs. [1] (1893) 28–.
— —, rotation of plane of polarisation of light by. *Thomson, J. J.* [1885] Camb. Ph. S. P. 5 (1886) 250–.
— —, theory of light for. *Voigt, W.* Gött. Nr. (1887) 177–.
— systems, electrical and optical phenomena, simplified theory. *Lorentz, H. A.* Amst. Ak. Vs. 7 (1899) 507–; Amst. Ak. P. 1 (1899) 427–.

INFLUENCE OF ELECTRIC AND MAGNETIC FIELDS ON LIGHT.

6635 General.

Bodies having rotatory influence on light, representation. *Garbasso, A.* Arch. Néerl. 5 (1900) 524–.
Dielectric, light propagated in, normal to lines of force. *Brace, D. B.* Ph. Mg. 44 (1897) 342–.

Electrolyte conveying current, velocity of light in. *Rayleigh, (Lord).* B. A. Rp. (1888) 341–.
Electrostatic field, action on optical properties, theory. *Voigt, W.* A. Ps. C. 69 (1899) 297–.
— —, optical properties. *König, W.* Frkf. a. M. Ps. Vr. Jbr. (1896–97) 26–.
Magnetic and electric forces, laws, and relation to light theory. *Stefan, J.* [1874] Wien Ak. Sb. 70 (1875) (*Ab.* 2) 589–.
— field, alteration of light waves in. *Hoppe, E.* [1898] Hamb. Mth. Gs. Mt. 3 (1900) 319–.
— —, dielectric constant and refractive index in. *Koch, K. R.* A. Ps. C. 63 (1897) 132–.
— —, effect on polarisation in dielectrics. *Aubel, E. van.* Brux. Ac. Bll. 10 (1885) 609–, [984]; 12 (1886) 280–.
— —, light wave surface in, deformation. *Fleischl, E. von.* [1884] Wien Ak. Sb. 90 (1885) (*Ab.* 2) 1151–.
— —, — — — — isotropic medium in. *Cornu, A.* C. R. 99 (1884) 1045–; Par. S. Ps. Sé. (1885) 33–.
— —, optical properties. *König, W.* Frkf. a. M. Ps. Vr. Jbr. (1896–97) 26.
— —, velocity of light in. *Morley, E. W., Eddy, H. T., & Miller, D. C.* Am. As. P. (1898) 123–.
— —, — — — —, experiments. *Morley, E. W., & Miller, D. C.* Ps. Rv. 7 (1898) 288–.
— —, vibrations of electrified systems in. *Lorentz, H. A.* Amst. Ak. Vs. 7 (1899) 320–; Amst. Ak. P. 1 (1899) 340–.
— rotation of non-polarised light. *Sohncke, —.* Jena. Sb. (1886) 4–; A. Ps. C. 27 (1886) 203–.
Magnetised bodies, transparent, velocity of light in. *Righi, A.* Bologna Ac. Sc. Mm. 8 (1877) 625–.
Magnetism and light, points of contact. *Barrett, W. F.* Tel. J. 4 (1876) 301–, 319–.
—, new action on light. *Kalischer, —.* Elektt. Z. 18 (1897) 221–, 679.
—, terrestrial, and optics. *Rudberg, F.* Quetelet Cor. Mth. 8 (1834) 217–.
Metal plate polarised by current, optical properties. *Lippmann, G.* Par. S. Ps. Sé. (1881) 32–.
Refractive indices of liquids, change by electric force. *Quincke, G. H.* A. Ps. C. 19 (1883) 773–.

6640 Double Refraction due to Electro- and Magneto-striction.

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Kerr, (Rev.) J. Ph. Mg. 50 (1875) 337–, 446–.
(Kerr's law.) *Gordon, J. E. H.* Ph. Mg. 2 (1876) 203–; 4 (1877) 104–.
(— —.) *Mackenzie, J. J.* A. Ps. C. 2 (1877) 356–.
(— —.) *Gordon, J. E. H.* R. S. P. 28 (1879) 346–.
(Liquids.) *Kerr, (Rev.) J.* Ph. Mg. 8 (1879) 85–, 229–; 13 (1882) 153–, 248–.
(Measurements and law.) *Kerr, (Rev.) J.* Ph. Mg. 9 (1880) 157–.
(Kerr's law.) *Röntgen, W. C.* Giessen Oberh. Gs. B. 19 (1880) 1–.
(Glass and carbon disulphide.) *Brongersma, H.* A. Ps. C. 16 (1882) 222–.
(Quartz.) *Röntgen, W. C.* Giessen Oberh. Gs. B. 22 (1883) 49–, 98–.
(—.) *Kundt, A.* A. Ps. C. 18 (1883) 228–.
(—.) (Kundt.) *Röntgen, W. C.* A. Ps. C. 19 (1883) 319–.
Quincke, G. H. A. Ps. C. 19 (1883) 729–.
(Liquids.) *Kundt, A.* Arch. Sc. Ps. Nt. 12 (1884) 521–.
(Charged Franklin's plate.) *Kerr, (Rev.) J.* Ph. Mg. 20 (1885) 363–.
Blondlot, R. Nancy S. Sc. Bll. (1887) xxv C. R. 106 (1888) 349–; J. de Ps. 7 (1888) 91–.
(Dispersion.) *Kerr, (Rev.) J.* B. A. Rp. (1892) 157–.
Basset, A. B. Nt. 48 (1893) 34–.
Des Coudres, T. D. Nf. Vh. (1893) (*Th.* 2, *Hälfte* 1) 67–.
Blondin, J. Lum. Élect. 52 (1894) 101–.
(Piezo-electric crystals.) *Pockels, F.* Gött. Ab. 39 (1894) (*Mth.-Ps.*) 204 pp.
(Kerr's law.) *Lemoine, J.* C. R. 122 (1896) 835–.
Pockels, F. Gött. Nr. (1896) 102–.
electric stress, optical demonstration. *Rücker, A. W., & Boys, C. V.* [1888] Tel. E. J. 17 (1889) 310–.
instantaneity of Kerr's phenomenon. *Abraham, H., & Lemoine, J.* C. R. 129 (1899) 206–.
reduction of relative retardations to absolute. *Kerr, (Rev.) J.* R. S. P. 55 (1894) 252–.
— — — — — — (Kerr). *Quincke, G.* Ph. Mg. 37 (1894) 508.
— — — — — — (Quincke). *Kerr, (Rev.) J.* Ph. Mg. 38 (1894) 144–.

Magnetic double refraction. *Goldhammer, D. A.* Kazan Un. Mm. (1899) (*Pt.* 4) 109–; A. Ps. C. 67 (1899) 696–.
— — —, connection with Zeeman effect. *Cotton, A.* C. R. 128 (1899) 294–.
— — — of sodium vapour. *Voigt, W.* Gött. Nr. (1898) 355–.
Optical torque. *Thompson, S. P.* R. I. P. 12 (1889) 474–.

6650 Magnetic Action on Polarised Light.

(*See also* **4040**; *and* **Chemistry, 7285.**)

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Faraday, M. [1845] Phil. Trans. (1846) 1–.
Böttger, R. Erdm. J. Pr. C. 36 (1845) 473–.
Taylor, G. Palomba Rac. 1 (1845) 390–.
Biot, J. B. J. Sav. (1846) 93–, 145–, 214–.
Böttger, R. Lieb. A. 57 (1846) 257–.
Faraday, M. Bb. Un. Arch. 1 (1846) 70–; A. C. 17 (1846) 359–.
Goldmann, J. Pogg. A. 67 (1846) 293–.
Henry, J. [1846] Am. Ph. S. P. 4 (*1847) 229–.

Majocchi, G. A. (VI *Adds.*) Majocchi A. Fis. C. 21 (1846) 75–, 238–.
Melloni, M. Nap. Rd. 5 (1846) 199–; (VI *Adds.*) Majocchi A. Fis. C. 23 (1846) 6–, 130–, 229–.
Mousson, A. Sch. Gs. Vh. (1846) 54–.
Pianciani, G. B. Palomba Rac. 2 (1846) 77–.
Pouillet, C. S. M. C. R. 22 (1846) 135–.
Becquerel, E. C. R. 22 (1846) 952–; 28 (1849) 623–.
Pianciani, G. B. Palomba Rac. 3 (1847) 273–.
Bertin, A. C. R. 26 (1848) 216–; A. C. 23 (1848) 5–.
Matteucci, C. A. C. 24 (1848) 354–; R. S. P. 5 (1848) 741–.
Melloni, M. Nap. Rd. 7 (1848) 172–.
(Heat.) *La Provostaye, F. H. de, & Desains, P.* C. R. 29 (1849) 352–.
Cockle, Jas. Ph. Mg. 36 (1850) 290–.
Matteucci, C. A. C. 28 (1850) 493–.
Wiedemann, G. Pogg. A. 82 (1851) 215–.
Codazza, G. Mil. G. I. Lomb. 4 (1852) 491–; 5 (1853) 299–.
Delarive, A. Arch. Sc. Ps. Nt. 32 (1868) 193–; C. R. 66 (1868) 1185–.
Jegorow [*Egorov*], —. [1870] St. Pét. Ac. Sc. Bll. 15 (1871) 492–; St. Pet. Ac. Sc. Mm. (*Rs.*) 18 (*1871) 194–.
Bichat, E. Par. Éc. Norm. A. 2 (1873) 277–.
Becquerel, H. C. R. 80 (1875) 1376–; 82 (1876) 308–; 83 (1876) 125–; A. C. 12 (1877) 5–.
Forbes, G. [1876] Edinb. R. S. P. 9 (1878) 85–.
(Forbes.) *Maxwell, J. C.* [1876] Edinb. R. S. P. 9 (1878) 91–.
Becquerel, H. C. R. 85 (1877) 1227–; 86 (1878) 1075–; 87 (1878) 1035.
Goossens, B. J. A. Ps. C. 4 (1878) 616.
Becquerel, H. C. R. 88 (1879) 334–; 89 (1879) 838–; A. C. 19 (1880) 90–.
(Heat in solids and liquids.) *Grunmach, L.* A. Ps. C. 14 (1881) 85–.
Perkin, W. H. C. S. J. 41 (1882) 330–.
Schaik, W. C. L. van. Arch. Néerl. 18 (1883) 70–.
Quincke, G. A. Ps. C. 24 (1885) 606–.
Chambers, (*Miss*) *J. M.* Elect. 17 (1886) 27–.
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Righi, A. Bologna Ac. Sc. Mm. 7 (1886) 443–.
Ostwald, W. C. S. J. 59 (1891) 198–.
Blondin, J. Lum. Élect. 49 (1893) 351–.
Gray, A. Nt. 48 (1893) 345–.
Larmor, J. L. Mth. S. P. 24 (1893) 272–.
(Rotatory dispersion of carbon bisulphide for infra-red rays.) *Moreau, G.* A. C. 1 (1894) 227–.
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Goldhammer, D. A. Kazan Un. Mm. (1899) (*Pt.* 4) 109–; A. Ps. C. 67 (1899) 696–.
amplification of displacements. *Becquerel, H.* C. R. 93 (1881) 143–.
and axiom of Clausius. *Brillouin, M.* Éclair. Élect. 15 (1898) 265–.
— — — — (Brillouin). *Wien, W.* Éclair. Élect. 25 (1900) 114–.
Becquerel's formula. *Aubel, E. van.* J. de Ps. 5 (1896) 509–.
calculation. *Hinrichs, G.* C. R. 113 (1891) 500–.
circular components. *Brace, D. B.* Nt. 62 (1900) 368–.
constants. *Joubin, P.* C. R. 105 (1887) 661–.
deduction from modified energy function. *Leathem, J. G.* [1898] Camb. Ph. S. T. 17 (1899) 16–.
by discharge of Leyden battery. *Bichat, E., & Blondlot, R.* C. R. 94 (1882) 1590–; As. Fr. C. R. (1886) (*Pt.* 1) 100.
— — — — jar. *Lodge, O.* L. Ps. S. P. 10 (1890) 103–; Ph. Mg. 27 (1889) 339–.
dispersion. *Verdet, É.* B. A. Rp. (1860) (*pt.* 2) 54–.
—. *Schaik, W. C. L. van.* Arch. Néerl. 17 (1882) 373–.
—. *Joubin, P.* A. C. 16 (1889) 78–; J. de Ps. 8 (1889) 53–.
—. *Wind, C. H.* [1897] Amst. Ak. Vs. 6 (1898) 92–; Fschr. Ps. (1897) (*Ab.* 2) 99–.
—. *Lorentz, H. A.* [1897] Amst. Ak. Vs. 6 (1898) 94–; Fschr. Ps. (1897) (*Ab.* 2) 99–.
—, anomalous (in metallic vapours). *Macaluso, D., & Corbino, O. M.* C. R. 127 (1898) 548–, 951–; Rm. R. Ac. Linc. Rd. 7 (1898) (*Sem.* 2) 293–; 8 (1899) (*Sem.* 1) 38–.
—, — (— — —) (Macaluso and Corbino). *Becquerel, H.* C. R. 127 (1898) 647–.
—, —. *Becquerel, H.* C. R. 127 (1898) 899–.
—, — (in metallic vapours) (Macaluso and Corbino). *Voigt, W.* Gött. Nr. (1898) 349–.
—, —. *Schmauss, A.* A. Ps. 2 (1900) 280–.
—, and Maxwell's theory. *Schaik, W. C. L. van.* Arch. Néerl. 21 (1887) 406–.
in doubly refracting bodies. *Ward, A. W.* [1889] R. S. P. 46 (1890) 65–.
— — — — (Ward). *Wiener, O., & Wedding, W.* [1889] R. S. P. 47 (1890) 1–.
duration. *Villari, E.* Mil. I. Lomb. Rd. 3 (1870) 457–.
—. *Abraham, H., & Lemoine, J.* Par. S. Ps. Sé. (1899) 155–; A. C. 20 (1900) 264–.
explanation by gyrostatic medium. *Gray, A.* [1898] R. I. P. 15 (1899) 703–.
and Hall effect. *Lorentz, H. A.* Amst. Ak. Vs. M. 19 (1884) 217–; Arch. Néerl. 19 (1884) 123–.
— — —, connection. *Chambers,* (*Miss*) *J. M.* Elect. 17 (1886) 69.
— — —, and gyroscope. *Élie, B.* J. de Ps. 1 (1882) 269–.
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measurement of constant and variable electric currents by. *Kopp, R.* Zür. Ps. Gs. Jbr. (1896 & 1897) 11–.
new meaning. *Reiff, R.* A. Ps. C. 57 (1896) 281–.
optical properties of glass cylinder revolving rapidly in magnetic field. *Duperray, C.* Par. S. Ps. Sé. (1896) 101–.
— — — magnetic bodies. *Verdet, É.* C. R. 44 (1857) 1209–; 45 (1857) 33–.

optical properties of transparent bodies under magnetic action. *Verdet, É.* A. C. 41 (1854) 370–; 43 (1855) 37–; 52 (1858) 129–; 69 (1863) 415–; C. R. 38 (1854) 613–; 39 (*1854) 548–; 43 (1856) 529–; 56 (1863) 630–; 57 (1863) 670–.
— torque. *Thompson, S. P.* R. I. P. 12 (1889) 474–.
by oscillating discharges. *Des Coudres, T.* Berl. Ps. Gs. Vh. (1896) 131–.
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—. *Gray, A.* Nt. 59 (1898–99) 367.
—. *Righi, A.* Rm. R. Ac. Linc. Rd. 8 (1899) (*Sem.* 1) 325–.
—, suggested tests. *Schoentjes, H.* Brux. Ac. Bll. 19 (1890) 444–; 20 (1890) 224–.
refraction, peculiar cases. *Brace, de W. B.* A. Ps. C. 26 (1885) 576–.
rotatory power. *Cesàro, E.* Rm. R. Ac. Linc. Rd. 5 (1889) (*Sem.* 2) 202–.
— —, effect of hollow tubes inside coils. *Gernez, D.* (IX) Par. S. Phlm. Bll. 9 (1872) (170–).
— —, — — mechanical change. *Lüdtge, R.* A. Ps. C. 137 (1869) 271–.
— —, — — temperature. *Joubert, J.* C. R. 87 (1878) 984–, 1078.
— —, measurement. *Becquerel, H.* C. R. 100 (1885) 1374–; Par. S. Ps. Sé. (1885) 117–; A. C. 6 (1885) 145–.
Ruhmkorff's apparatus for. *Biot, J. B.* C. R. 23 (1846) 538–.
structural and magneto-optic rotation, relation. *Wright, A. W., & Kreider, D. A.* Am. J. Sc. 6 (1898) 416–.

Theory.

(Equations.) *Airy, G. B.* Ph. Mg. 28 (1846) 469–.
Rowland, H. A. Am. J. Mth. 3 (1880) 89–; Ph. Mg. 11 (1881) 254–.
Voigt, W. A. Ps. C. 23 (1884) 493–.
Righi, A. Rm. R. Ac. Linc. Rd. 2 (1886) (*Sem.* 2) 7–.
(Thomson's hypothesis.) *Šebuev, G. N.* Kazan S. Nt. (*Ps.-Mth.*) P. 5 (1887) 186–.
Sternberg, M. Wien Ak. Sb. 94 (1887) (*Ab.* 2) 95–.
Eddy, H. T. Am. As. P. (1889) 129–.
Potier, —. C. R. 108 (1889) 510–; Par. S. Ps. Sé. (1889) 83–.
(Potier.) *Vaschy, —.* C. R. 108 (1889) 848–; Par. S. Ps. Sé. (1889) 92.
(Vaschy.) *Potier, —.* Par. S. Ps. Sé. (1889) 94.
Gray, A. B. A. Rp. (1891) 558–.
Goldhammer, D. A. A. Ps. C. 46 (1892) 71–.
Drude, P. A. Ps. C. 46 (1892) 353–.
Goldhammer, D. A. [1892] A. Ps. C. 47 (1892) 345–; Kazan S. Ps.-Mth. Bll. 2 (1893) 1–; Fschr. Ps. (1892) (*Ab.* 2) 100–.
Drude, P. A. Ps. C. 48 (1893) 122–.
Goldhammer, D. A. A. Ps. C. 48 (1893) 740–.
Drude, P. A. Ps. C. 49 (1893) 690–.
Goldhammer, D. A. A. Ps. C. 50 (1893) 772; Kazan S. Ps.-Mth. Bll. 2 (1893) 207–; 3 (1893) 27–.
Larmor, J. B. A. Rp. (1893) 335–.
Verner, A. J. de Ps. 2 (1893) 221–.
Drude, P. A. Ps. C. 52 (1894) 496–.
Basset, A. B. Nt. 52 (1895) 618; 53 (1895–96) 130; Am. J. Mth. 19 (1897) 60–; Mth. A. 49 (1897) 247–.
(Faraday and Hall effects.) *Wind, C. H.* [1896] Amst. Ak. Vh. (*Sect.* 1) 5 (1897) *No.* 3, 91 pp.; Arch. Néerl. 1 (1898) 119–.
(Basset.) *Larmor, J.* Am. J. Mth. 19 (1897) 371–.
Eddy, H. T. Ps. Rv. 7 (1898) 283–.
Drude, P. D. Ps. Gs. Vh. (1899) 107–.
Larmor, J. [1899] Camb. Ph. S. P. 10 (1900) 181–.
Voigt, W. A. Ps. C. 67 (1899) 345–.
Ketteler, E. A. Ps. C. 68 (1899) 125–.
Lorentz, H. A. [1900] Sc. Abs. 4 (1901) 582.
Voigt, W. A. Ps. 1 (1900) 389–.

and thermodynamics. *Planck, M.* D. Ps. Gs. Vh. (1900) 206–.
Verdet's constant in absolute units. *Gordon, J. E. H.* [1876] Phil. Trans. 167 (1877) 1–.
— — — — —. *Arons, L.* A. Ps. C. 24 (1885) 161–.
— law, verification. *Cornu, A., & Potier, A.* C. R. 102 (1886) 385–; Par. S. Ps. Sé. (1886) 53–.
and Zeeman effect, interpretation. *Becquerel, H.* C. R. 125 (1897) 679–.
— — —, relation. *FitzGerald, G. F.* R. S. P. 63 (1898) 31–.
— — —, —. *Voigt, W.* Gött. Nr. (1898) 329–.
— — —, —. *Macaluso, D., & Corbino, O. M.* Rm. R. Ac. Linc. Rd. 8 (1899) (*Sem.* 1) 116–.

KERR EFFECT (REFLECTION FROM MAGNETIC POLE).

Kerr, (Rev.) J. B. A. Rp. (1876) (*Sect.*) 40–; Ph. Mg. 3 (1877) 321–.
FitzGerald, G. F. R. S. P. 25 (1877) 447–.
Kerr, (Rev.) J. Ph. Mg. 5 (1878) 161–.
FitzGerald, G. F. [1879–85] Phil. Trans. 171 (1880) 691–; Ph. Mg. 19 (1885) 100–.
Righi, A. Rm. R. Ac. Linc. Rd. 1 (1885) 463–; Rm. R. Ac. Linc. Mm. 1 (1885) 367–; 3 (1886) 14–, 562–; A. C. 4 (1885) 433–; 9 (1886) 65–.
Du Bois, H. E. J. G. A. Ps. C. 39 (1890) 25–.
Sissingh, R. Amst. Ak. Vh. 28 (1890) 64 pp.; A. Ps. C. 42 (1891) 115–, 680; Arch. Néerl. 27 (1894) 173–.
Rosenqvist, J. A. Fschr. Ps. (1892) (*Ab.* 2) 643–.
(Theory.) *Basset, A. B.* [1893] Camb. Ph. S. P. 8 (1895) 68–.
Wind, C. H. [1894] Amst. Ak. Vs. 3 (1895) 82–; Berl. Ps. Gs. Vh. (1894) 84–.
(Theory.) *Koláček, F.* Prag Sb. (1895) (*Mth.-Nt.*) *No.* 19, 31 pp.

Sissingh, R. Delft Éc. Pol. A. 8 (1897) 13–.
Abraham, H., & Lemoine, J. Par. S. Ps. Sé. (1899) 62–.
in bismuth. *Hurion, —.* C. R. 98 (1884) 1257–; Isère S. Bll. 24 (1884) 190.
— —. *Drude, P.* Gött. Nr. (1890) 480–.
— cobalt and iron. *Zeeman, P.* Amst. Ak. Vs. 3 (1895) 221–.
— — — nickel. *Zeeman, P.* Amst. Ak. Vs. [2] (1894) 175–; Arch. Néerl. 1 (1898) 376–.
— — — — and iron. *Zeeman, P.* [1892] Amst. Ak. Vs. [1] (1893) 19–, 58–, 155–; Arch. Néerl. 27 (1894) 252–.
comparison of measurements with Goldhammer's and Drude's theories. *Zeeman, P.* [1893] Amst. Ak. Vs. [2] (1894) 82–; Arch. Néerl. 1 (1898) 354–.
influence of surface layers. *Micheli, F. J.* [1899] A. Ps. 1 (1900) 542–; Arch. Sc. Ps. Nt. 9 (1900) 238–, 313–.
in iron. *Zeeman, P.* [1896] Amst. Ak. Vs. 5 (1897) 103–; Arch. Néerl. 1 (1898) 221–.
laws and application. *Du Bois, H. E. J. G.* B. A. Rp. (1889) 515–.
phase change. *Wind, C. H.* Amst. Ak. Vs. [2] (1894) 116–; Arch. Néerl. 1 (1898) 369–.
— and intensity. *Waals, — van der.* Amst. Ak. Wet. P. (1883–84) *No.* 9, 7–.

KUNDT EFFECT (ROTATION OF PLANE OF POLARISATION BY THIN METALLIC FILMS).

(Iron, cobalt and nickel.) *Kundt, A.* Berl. Ak. Sb. (1884) 761–.
(—, — — —.) *FitzGerald, G. F.* A. Ps. C. 25 (1885) 136–.
(—.) *Kundt, A.* Berl. Ak. Sb. (1885) 1055–.
(Cobalt and nickel.) *Du Bois, H. E. J. G.* A. Ps. C. 31 (1887) 941–, 1048.
(Iron, cobalt and nickel.) *Lobach, W.* A. Ps. C. 39 (1890) 347–.
(—, — — —, theory.) *Leathem, J. G.* [1897] Phil. Trans. (A) 190 (1898) 89–.
(—, — — —, —.) *Drude, P.* A. Ps. C. 62 (1897) 687–.
(—, — — —, —.) *Goldhammer, D. A.* A. Ps. C. 65 (1898) 111–.

Magnetic media, optical constants. *Ketteler, E.* A. Ps. C. 24 (1885) 119–.
— —, reflection and refraction at surface. *Basset, A. B.* [1890] Phil. Trans. (A) 182 (1892) 371–.
Optical ammeters and voltmeters, best dimensions for. *Kennelly, A. E.* Elect. 25 (1890) 701–.
— method of measuring absolute intensity of currents. *Becquerel, H.* Lum. Élect. 12 (1884) 321–.

6655 Magnetic Rotation of Special Substances.

(*See also* 4050; *and* Chemistry, 7285.)

Acids and salt solutions. *Wachsmuth, R.* A. Ps. C. 44 (1891) 377–, 787.
— — — —. *Humburg, O.* Z. Ps. C. 12 (1893) 401–.
— — — —. *Forchheimer, J.* Z. Ps. C. 34 (1900) 20–.
Air. *Lippich, F.* Wien Az. 16 (1879) 126–.
Carbon disulphide (constant). *Rayleigh, (Lord).* [1884–85] R. S. P. 37 (1884) 146–; Phil. Trans. 176 (1886) 343–.
— — (—). *Koepsel, A.* A. Ps. C. 26 (1885) 456–.
— — vapour. *Kundt, A., & Röntgen, W. C.* Münch. Ak. Sb. 8 (1878) 546–; 9 (1879) 30.
— — and water. *Rodger, J. W., & Watson, W.* [1895] Phil. Trans. (A) 186 (1896) 621–.
Chlorine. *Righi, A.* Bologna Rd. 3 (1899) 83–.
Crystals. *Chauvin, —.* C. R. 102 (1886) 972–.
Ferric chloride. *Ščeglajev, V. S.* A. Ps. C. 28 (1886) 168–; Mosc. Un. Mm. (*Ps.-Mth.*) 7 (1887) 72 pp.
Gases. *Becquerel, H.* C. R. 88 (1879) 709–; Par. S. Ps. Sé. (1879) 94–.
—. *Kundt, A., & Röntgen, W. C.* Münch. Ak. Sb. 9 (1879) 148–.
—. *Becquerel, H.* C. R. 90 (1880) 1407–; A. C. 21 (1880) 289–.
—. *Kundt, A., & Röntgen, W. C.* A. Ps. C. 10 (1880) 257–.
—, dispersion. *Siertsema, L. H.* Amst. Ak. Vs. 4 (1896) 294–, 317–; 5 (1897) 132; J. de Ps. 7 (1898) 289–; Amst. Ak. Vs. 7 (1899) 289–; Amst. Ak. P. 1 (1899) 296–.
—, liquefied. *Siertsema, L. H.* [1900] Amst. Ak. Vs. 9 (1901) 56–; Amst. Ak. P. 3 (1901) 70–.
Glass, compressed. *Edlund, E.* Stockh. Öfv. 9 (1852) 23–; Lieb. A. 87 (1853) 338–.
—, strained. *Wedding, W.* A. Ps. C. 35 (1888) 25–.
—, tempered, and Fresnel's parallelepipeds. *Bertin, A.* C. R. 28 (1849) 500–.
Hydrochloric acid solution. *Schönrock, O.* Z. Ps. C. 16 (1895) 29–.
Iceland spar. *Chauvin, —.* C. R. 108 (1889) 1097–; Toul. Fac. Sc. A. 3 (1889) J, 49 pp.
Liquids. *Bertin, A.* Strasb. S. H. Nt. Mm. 5 (*Livr.* 2 & 3) (1862) 1 (*bis*)–.
—. *Delarive, A.* C. R. 71 (1870) 195–; Arch. Sc. Ps. Nt. 38 (1870) 209–.
—. *Du Bois, H. E. J. G.* A. Ps. C. 35 (1888) 137–.
—. *Borgman, I. I.* Rs. Ps.-C. S. J. 22 (*Ps.*) (1890) 170–.
— and salt solutions. *Jahn, H.* Berl. Ak. Sb. (1891) 237–; A. Ps. C. 43 (1891) 280–.
— — — —. *Schönrock, O.* Z. Ps. C. 11 (1893) 753–.

Liquids and their vapours. *Bichat, E.* J. de Ps. 8 (1879) 204–; 9 (1880) 275–.
Organic compounds, refraction, dispersion, and molecular magnetic rotation. *Gladstone, —, & Perkin, —.* As. Fr. C. R. (1889) (*Pt.* 1) 270.
Oxygen. *Siertsema, L. H.* Amst. Ak. Vs. 8 (1900) 4–; Amst. Ak. P. 2 (1900) 19–.
—, dispersion. *Siertsema, L. H.* Amst. Ak. Vs. [2] (1894) 31–; 3 (1895) 230–; Nt. 51 (1894–95) 470; J. de Ps. 7 (1898) 288–.
— and other gases, and water. *Siertsema, L. H.* Arch. Néerl. 2 (1899) 291–.
Quartz. *Basset, A. B.* Ph. Mg. 30 (1890) 152–.
—. *Borel, A.* C. R. 128 (1899) 1095–.
Salt solutions. *Oppenheimer, S.* Z. Ps. C. 27 (1898) 447–.
— —, negatively rotating, dispersion. *Siertsema, L. H.* Arch. Néerl. 5 (1900) 447–.
Tartaric acid. *Bichat, E.* Nancy S. Sc. Bll. 4 (12e *Ann.*) (1879) 10–.
Thallium alcohol. *Delarive, A.* C. R. 67 (1868) 32–.
Transparent compounds. *Matthiessen, Ad.* C. R. 24 (1847) 969–; Bb. Un. Arch. 5 (1847) 126–.
— solids. *Matthiessen, Ad.* C. R. 25 (1847) 20–.
Vapours. *Bichat, E.* C. R. 88 (1879) 712–.
Vitrified compounds. *Matthiessen, Ad.* C. R. 25 (1847) 173–.
Water (constant). *Siertsema, L. H.* Amst. Ak. Vs. 5 (1897) 131; J. de Ps. 7 (1898) 289–.

Perkin's Determinations.

Undecylenic acid, mono- and di-allylacetic acids, and ethyl diallylmalonate. C. S. J. 49 (1886) 205–.
Mixtures of water with fatty acids, with alcohol, and with sulphuric acid. C. S. J. 49 (1886) 777–.
Tartaric and racemic acids, ethereal salts. C. S. J. 51 (1887) 362–.
Chloral, chloral hydrate, and hydrated aldehyde. C. S. J. 51 (1887) 808–.
Saturated and unsaturated bibasic acids, and mesityl oxide. C. S. J. 53 (1888) 561–.
Derivatives of chlorofumaric and chloromaleic acids. C. S. J. 53 (1888) 695–.
Nitrogen compounds, and hydrochloric, hydrobromic and hydriodic acids. C. S. J. 55 (1889) 680–.
Saline solutions. [1890] C. S. P. 6 (1891) 141–.
Solutions of ammonium and sodium salts of some fatty acids. C. S. J. 59 (1891) 981–.
Sulphuric and nitric acids and their aqueous solutions; and solutions of sodium sulphate and lithium nitrate. C. S. J. 63 (1893) 57–.
Ethylene oxide. C. S. J. 63 (1893) 488–.
Hydrogen chloride in different solvents, sodium chloride, lithium chloride and chlorine. C. S. J. 65 (1894) 20–.
Halogenated fatty acids, acetic and propionic acids, phosgene and ethyl carbonate. C. S. J. 65 (1894) 402–.
Unsaturated hydrocarbons. C. S. J. 67 (1895) 255–.
Aromatic compounds. C. S. J. 69 (1896) 1025–, [1756].
Benzenoid hydrocarbons. C. S. J. 77 (1900) (*Pt.* 1) 267–.

6660 Influence of Magnetism on the Emission and Absorption of Light.

(*See also* 4208.)

Absorption. *Tait, P. G.* [1876] Edinb. R. S. P. 9 (1878) 118–.
—. *Righi, A.* Berl. Ak. Sb. (1898) 600–, 893–; C. R. 127 (1898) 216–; Rm. R. Ac. Linc. Rd. 7 (1898) (*Sem.* 2) 41–, 333–.
—. *Cotton, A.* C. R. 127 (1898) 953–, 1256–.
— (Righi). *Thompson, S. P.* B. A. Rp. (1898) 789–.
—. *Righi, A.* Bologna Rd. 3 (1899) 116–; C. R. 128 (1899) 45–.
Transparency of bismuth. *Buisson, H.* C. R. 126 (1898) 462–.

ZEEMAN EFFECT (RADIATION IN MAGNETIC FIELD).

Zeeman, P. [1896–97] Amst. Ak. Vs. 5 (1897) 181–, 242–; 6 (1898) 408–; Ph. Mg. 43 (1897) 226–; 45 (1898) 197–.
Garbasso, A. N. Cim. 6 (1897) 8–.
König, W. A. Ps. C. 62 (1897) 240–.
Lodge, O. Elect. 38 (1897) 568–, 643–; R. S. P. 60 (1897) 513–.
Larmor, J. R. S. P. 60 (1897) 514–.
Lodge, O., & Davies, B. R. S. P. 61 (1897) 413–.
Michelson, A. A. Asps. J. 6 (1897) 48–.
Preston, T. [1897] Dubl. S. Sc. T. 6 (1898) 385–.
Becquerel, H., & Deslandres, H. C. R. 126 (1898) 997–; 127 (1898) 18–.
Cotton, A. Éclair. Élect. 14 (1898) 405–, 540–.
Lorentz, H. A. [1898] Amst. Ak. Vs. 7 (1899) 113–; Amst. Ak. P. 1 (1899) 90–.
Michelson, A. A. Asps. J. 7 (1898) 131–.
Preston, T. Ph. Mg. 45 (1898) 325–.
Brit. Ass. Comm. B. A. Rp. (1899) 63–.
Goldhammer, D. A. Kazan Un. Mm. (1899) (*Pt.* 4) 109–; A. Ps. C. 67 (1899) 696–.
Preston, T. [1899] Nt. 59 (1898–99) 224–; 61 (1899–1900) 11–.
Righi, A. [1899] Bologna Ac. Sc. Mm. 8 (1899–1900) 263–.
Reese, H. M. Asps. J. 12 (1900) 120–.
Righi, A. Éclair. Élect. 23 (1900) 356–; Rv. Sc.-Ind. 32 (1900) 209–.
Voigt, W. Ps. Z. 1 (1900) 116–, 128–, 138–.
converse. *FitzGerald, G. F.* Nt. 59 (1898–99) 222.
and double refraction due to magnetic field, connection. *Cotton, A.* C. R. 128 (1899) 294–.

and other effects due to metallic vapours in magnetic field, relation. *Corbino, O. M.* Rm. R. Ac. Linc. Rd. 8 (1899) (*Sem.* 1) 250–.
electric analogue. *Voigt, W.* Arch. Néerl. 5 (1900) 366–.
experiment to illustrate. *FitzGerald, G. F.* Nt. 59 (1898-99) 509, 557.
and Faraday effect, interpretation. *Becquerel, H.* C. R. 125 (1897) 679–.
— — —, relation. *FitzGerald, G. F.* R. S. P. 63 (1898) 31–.
— — —, —. *Voigt, W.* Gött. Nr. (1898) 329–.
— — —, —. *Macaluso, D., & Corbino, O. M.* Rm. R. Ac. Linc. Rd. 8 (1899) (*Sem.* 1) 116–.
Geissler tubes in magnetic field, phenomena. *Egoroff, N., & Géorgiewsky, N.* C. R. 130 (1900) 900–.
— — — — —, polarisation of light from. *Dongier, R.* C. R. 130 (1900) 244–, 650–.
— —, use in investigations. *Paschen, F.* Ps. Z. 1 (1900) 478–.
in glowing gases. *Geitel, H.* Braunschw. Vr. Nt. Jbr. (11) (1899) 67–.
interferometer observations. *Michelson, A. A.* Nt. 59 (1898–99) 440–.
— —. *Preston, T.* Nt. 59 (1898–99) 485, 605.
— —. *Rayleigh, (Lord).* Nt. 59 (1898–99) 533.
— —. *Shedd, J. C.* Ps. Rv. 9 (1899) 1–, 86–.
investigation, simple method. *Cotton, A.* C. R. 125 (1897) 865–.
ions, charge and mass. *Lorentz, H. A.* Amst. Ak. Vs. 6 (1898) 506–, 555–; Fschr. Ps. (1898) (*Ab.* 2) 384–.
—, motion. *Blumenthal, O.* Z. Mth. Ps. 45 (1900) 119–.
kinematic interpretation. *Cornu, A.* C. R. 125 (1897) 555–; Éclair. Élect. 13 (1897) 241.
— —. *Righi, A.* Rm. R. Ac. Linc. Rd. 7 (1898) (*Sem.* 1) 295–.
— —, Cornu's. *Corbino, O. M.* Rm. R. Ac. Linc. Rd. 7 (1898) (*Sem.* 1) 241–.
and luminous beats. *Corbino, O. M.* Rm. R. Ac. Linc. Rd. 8 (1899) (*Sem.* 1) 171–.
partial polarisation of light in magnetic field. *Egoroff, N., & Géorgiewsky, N.* C. R. 124 (1897) 748–, 949–; 125 (1897) 16–.
— — — — — — — —. *Cotton, A.* C. R. 125 (1897) 1169–.
— — — — — — — —. *Lorentz, H. A.* Amst. Ak. Vs. 6 (1898) 193–; Arch. Néerl. 2 (1899) 1–.
passage of light through vapours in magnetic field. *Macaluso, D., & Corbino, O. M.* C. R. 127 (1898) 548–, 951–.
spectral lines. *Fievez, C.* Brux. Ac. Bll. 9 (1885) 381–.
— —, perturbations. *Preston, T.* [1899] Dubl. S. Sc. T. 7 (1902) 7–; Nt. 59 (1898–99) 248; Ph. Mg. 47 (1899) 165–; R. I. P. 16 (1902) 151–.
theory. *FitzGerald, G. F.* Nt. 56 (1897) 468.
theory. (Magnetic influence on spectra; and radiation from moving ions.) *Larmor, J.* Ph. Mg. 44 (1897) 503–.
—. *Lorentz, H. A.* [1897–99] A. Ps. C. 63 (1897) 278–; Ps. Z. 1 (1900) 39–.
—. *Voigt, W.* A. Ps. C. 68 (1899) 352–.
—, Lorentz's. *Poincaré, H.* Éclair. Élect. 11 (1897) 481–.
—, —. *Liénard, A.* Éclair. Élect. 14 (1898) 417–, 456–.
—, —. *Poincaré, H.* Éclair. Élect. 19 (1899) 5–.
—, — (Poincaré). *Lorentz, H. A.* [1899] Amst. Ak. Vs. 8 (1900) 69–; Amst. Ak. P. 2 (1900) 52–.
—, — and Larmor's. *Liénard, A.* Éclair. Élect. 16 (1898) 320–, 360–.

ELECTRIC DISCHARGE.

6800 General.

Bezold, W. von. Münch. Sb. (1870) (1) 113–.
Moutier, J. C. R. 77 (1873) 1238–.
(Duration.) *Edlund, E.* Stockh. Öfv. 31 (1874) *No.* 3, 5–.
Schneebeli, H. [1875] Neuch. S. Sc. Bll. 10 (1876) (*App.*) 3 pp.
Hellmann, H. A. Ps. C. 14 (1881) 543–.
Wiedemann, E., & Ebert, H. A. Ps. C. 36 (1889) 643–.
Wesendonck, K. A. Ps. C. 49 (1893) 295–.
Action, chemical. *Becquerel, A. C.* [1871–76] C. R. 73 (1871) 65–, 302–, 1345–; 74 (1872) 83–; Par. Ac. Sc. Mm. 38 (1873) 238–; C. R. 82 (1876) 353–; Par. Ac. Sc. Mm. 41 (1879) *No.* 1, 61–.
— on flames. *Neyreneuf, V.* C. R. 76 (1873) 1000–.
— — —, liquids and powders. *Neyreneuf, V.* C. R. 76 (1873) 1351–.
— — gases. *Chabrier, C.* C. R. 75 (1872) 484–.
— — —. *Neyreneuf, V.* C. R. 78 (1874) 950–.
— — —, flames and solids. *Neyreneuf, V.* A. C. 2 (1874) 473–.
— — — and vapours. *Ludeking, C.* Ph. Mg. 33 (1892) 521–.
— — particles suspended in air. *Obermayer, A. von, & Pichler, M. (Ritter) von.* Wien Ak. Sb. 93 (1886) (*Ab.* 2) 408–.
Analysis. *Holtz, W.* Gött. Nr. (1880) 345–.
Anode and cathode, behaviour. *Przibram, K.* Wien Ak. Sb. 108 (1899) (*Ab.* 2*a*) 1161–.
Attraction due to discharge. *Obermayer, A. von.* Wien Ak. Sb. 100 (1891) (*Ab.* 2*a*) 100–.
Conduction of current, influence on nature of its discharge. *Riess, P.* Berl. B. (1856) 241–.
Currents of short duration, comparison with discharge. *Edlund, E.* Arch. Sc. Ps. Nt. 47 (1873) 195–.

DISCHARGE IN VARIOUS MEDIA.

in air. *Wright, A. W.* Am. J. Sc. 1 (1871) 437–.
— — (and ball lightning). *Toepler, M.* A. Ps. 2 (1900) 560–.
— —, from circular discs. *Bell, C. J.* Am. J. Sc. 9 (1875) 458–.
— — and gases, nature. *Trowbridge, J.* Am. Ac. P. 33 (1898) 433–.
— dust-filled spaces. *Zenger, C.* Lum. Élect. 38 (1890) 251–.
— gases. *Lehmann, O.* A. Ps. C. 11 (1880) 686–; D. Nf. B. (*1883) 59–.
— —. *Wiedemann, E. E. G.* A. Ps. C. 20 (1883) 756–; Ph. Mg. 18 (1884) 35–, 85–.
— —. *Goldhammer, M.* Rs. Ps.-C. S. J. 16 (*Ps.*) (1884) 325–; J. de Ps. 4 (1885) 596–.
— —. *Lehmann, O.* A. Ps. C. 22 (1884) 305–.
— —. *Schuster, A.* A. Ps. C. 24 (1885) 74–; R. S. P. 42 (1887) 371–; 47 (1890) 526–.
— — (Schuster). *Thomson, J. J.* Nt. 42 (1890) 295.
— — (Thomson). *Schuster, A.* Nt. 42 (1890) 591–.
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— — — — — — (Obermayer). *Wesendonck, K.* A. Ps. C. 47 (1892) 175–.
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6820 Disruptive Discharge. The Electric Spark. Oscillatory Discharge.

(*See also* 5220. *For* Lightning, *see* 5270.)

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— —, peculiar action. *Oppel, J. J.* (XII) Frkf. a. M. Ps. Vr. Jbr. (1860-61) 38–.
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